REPORT RESUMES

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CURRENT PROJECTS ON ECONOMIC AND SOCIAL IMPLICATIONS OF SCIENCE AND TECHNOLOGY 1964.

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THIS PUBLICATION IS THE SIXTH ANNUAL INVENTORY OF RESEARCH PROJECTS WHICH ARE CURRENTLY IN PROGRESS AT COLLEGES AND UNIVERSITIES AND WHICH DEAL WITH THE SOCIAL AND ECONOMIC IMPACTS OF SCIENCE AND TECHNOLOGY. THE INFORMATION INVOLVED IN THIS DOCUMENT WAS COMPILED BY THE NATIONAL SCIENCE FOUNDATION FOR THE USE OF SCHOLARS, ADMINISTRATORS, AND OTHERS CONCERNED WITH THIS GROWING FIELD OF INQUIRY. EACH ENTRY INCLUDES (1) THE NAME OF THE PROJECT DIRECTOR, (2) PROJECT TITLE, (3) PROJECT ADDRESS, AND (4) A BRIEF DESCRIPTION OF THE PROJECT. THE 14 CATEGORY AREAS ARE (1) AGRICULTURE AND RURAL SOCIOLOGY, (2) GENERAL ECONOMIC ANALYSIS, (3) HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY, (4) INTERNATIONAL AND FOREIGN STUDIES, (5) ADMINISTRATION, ORGANIZATION, AND MANAGEMENT, (6) PUBLIC POLICY, GOVERNMENT AND NATIONAL DEFENSE, (7) IMPACTS OF SELECTED INDUSTRIES, (8) SCIENTIFIC AND ENGINEERING MANPOWER - PERFORMANCE, EDUCATION, AND CREATIVITY, (9) SOCIOLOGY AND PSYCHOLOGY, (10) ECONOMIC DEVELOPMENT, (11) PATENTS AND TRADEMARKS, (12) AUTOMATION AND IMPACTS ON LABOR, (13) INNOVATION, INCLUDING IMPACTS ON SPECIFIC INVENTIONS AND NEW PROCESSES, AND (14) DECISION MAKING. APPENDED ARE (1) CROSS-REFERENCES TO PROJECTS WHICH ALSO PERTAIN TO SCIENCE INFORMATION, SPACE, AND STATE AND REGIONAL STUDIES, (2) RELATED COMPILATIONS OF RESEARCH PROJECTS, (3) REPORTS OF THE STATUS OF PROJECTS THAT WERE LISTED IN THE 1963 INVENTORY, (4) AUTHOR AND INSTITUTION INDEXES, AND (5) THE FORMS USED IN OBTAINING INFORMATION. THIS DOCUMENT IS ALSO AVAILABLE FOR $0.55 FROM THE SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402. (DS)

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Current Projects on
Economic and Social Implications of Science and Technology
1964

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FOREWORD

This publication is the sixth annual inventory of current research projects, in progress at colleges and universities, which deal with the social and economic impacts of science and technology. The National Science Foundation has compiled this reference work for the use of scholars, administrators, and others concerned with this growing field of inquiry. The Introduction describes the historical background of the survey and the method by which it has been conducted.

We gratefully acknowledge the cooperation and continuing support of both the respondents of the series and the deans at the colleges and universities.

All details pertaining to the projects were furnished by the respondents. The National Science Foundation assumes no responsibility for the information reported.

JACOB PERLMAN,
Head, Office of Economic and Manpower Studies,
National Science Foundation.

JUNE 1965.

The survey was conducted and the report compiled by Suzanne Snowden Dovydenas, Intersectoral Studies and Trends Group, Kathryn S. Arnow, Study Director. Material pertaining to the survey was reviewed by Olive Q. Baker, Assistant Study Director.

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Inquiries concerning research projects should be addressed directly to the investigator.

INTRODUCTION

Purpose of the Survey

The National Science Foundation initiated the annual surveys of current research activity on the economic and social implications of science and technology, in 1958, in recognition of intensified interest in this area in the postwar period. In the National Science Foundation Act of 1950 the Foundation is authorized ". . . to appraise the impact of research upon industrial development and upon the general welfare," and a continuing inventory of research projects in the area appeared to be a constructive first step toward meeting this responsibility.

Recent events have given social scientists increasing opportunities to observe the economic and social impacts of achievements in science and technology in both the industrialized and the developing nations. Such study has enabled them to investigate the problems which arise when a particular society or group must anticipate and appraise the impacts of science and technology and make appropriate institutional adjustments. Because these adjustments require critical decisions which affect the lives of many people, even entire populations, such research is of concern not only to researchers but also to persons responsible for technical assistance programs. The Foundation's annual inventory is designed to inform this broad community and, in particular, to enable social scientists to learn about current work in their fields, to exchange ideas, and to modify the course of their own projects, if desirable.

The widespread financial support of these projects reflects strong incentives throughout society for acquiring better understanding of the economic and social implications of science and technology. Funds for many of the projects come from Federal agencies such as the National Institutes of Health, National Aeronautics and Space Administration, and Departments of Labor and Agriculture. State governments contribute support through various State departments and commissions and through the longstanding Federal-State program of agricultural research. Private companies from time to time also finance projects, as do nonprofit organizations such as the Ford Foundation. In the universities, fellowships and small grants from university resources also contribute support to some investigators.

Nature of the Inventory

The annual inventory is essentially a descriptive listing of current research projects, carried out in colleges and universities, which may result in books and articles and in further research and study. In 1960, the area of the survey was enlarged from studies in scientific research and development to the entire range of science and technology. As a result, the scope of the inquiry has been deliberately left without sharp definition, but it could be characterized as "the concern of social scientists with the natural sciences and technology." The outcome of such concern may vary from a specific study on the economic impact of a new type of agricultural implement on a small community to a treatise on the influence of scientific thought on the evolution of widely spread economic and social philosophies.

Administrative Aspects

The annual surveys are conducted in accredited U.S. colleges and universities that offer doctoral degrees in the social sciences, business administration, agriculture, and other fields in which pertinent projects are likely to occur. When the first survey was initiated in 1958 at colleges and universities, the plan was gradually to extend coverage to nonprofit research institutions, industry, and Government. Accordingly, the 1959 survey was expanded to include foundations and research-oriented associations and societies as well as educational institutions. Replies from the nonacademic institutions revealed that their volume of intramural research activity on economic and social implications of science and technology was negligible. Of 238 institutions contacted, only 13 reported pertinent intramural projects. In view of this response, and after inquiries at Federal and other organizations, the decision was made to confine the survey to the academic sector.

Annual survey questionnaires are addressed to deans of graduate schools; deans of other schools or colleges where relevant projects are likely to exist, i.e., agriculture, business administration, government, etc.; university research directors; and the investigators responsible for projects listed the preceding year in *Current Projects*. This method was selected after discussions with a number of authorities in university administration and a series of pretest interviews with deans at five Washington-area universities.

Respondents provide the details on their projects, the title, name of investigator or investigators, location of the project, starting date, expected date of completion, planned final form, and a résumé of the research. The reports of the surveys list the studies classified under the various subject headings, with cross-references where necessary. Requests for more information on individual studies should be directed to the principal investigators at their institutions.

In Appendix A of the current edition, the listing of Regional Studies includes a breakdown of projects by State. Since the 1963 inventory, and added appendix contains a followup of projects listed in the previous edition together with bibliographic information on resulting publications.

Survey Response

Cooperation on the part of the universities has been most gratifying and response rates have been extremely high. An impressive aspect of the *Current Projects* surveys is the increase in the number of projects reported annually. The 1959 inventory included 96 entries; in the following years the number increased to 216, 262, 306, 356 and, in this 1964 edition, 405. Undoubtedly, some of the increase results from a growing awareness of the survey in the universities, and therefore more investigators are reached every year. Moreover, the expansion of survey scope, in 1960, to cover the entire range of science and technology also led to an increase in the number of items reported. However, beyond these factors, it appears that the increasing number of projects is to a very large extent a result of growing interest in the field.

In form, the studies range from individual brief investigations to long-range, continuing research projects conducted by large staffs at several institutions. Most of the projects are concerned with economic aspects of technological change and innovation; economic impacts of new technology in agriculture; the administration of research and development; utilization of scientific and engineering manpower; public policy relating to science and technology; and the history, philosophy, and sociology of science and technology.

The projects have used predominantly empirical methods of investigation, indicating a strong interest in facts and figures surrounding the economic and social impacts of science and technology. Purely abstract studies are relatively few and are found most often in the fields of economic and sociological theory. In keeping with the current interest in mathematical analysis in the social sciences, may of the theoretical studies include the construction of mathematical models.

Financial information requested in the survey questionnaire is confidential. A large majority of research projects receive some form of outside financial support, the largest single contributor of funds being the Federal Government.* The increased availability of research funds in the fields under discussion is at least partially responsible for the growing proportion of long-term and continuing projects over the years.

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* While the National Science Foundation does award grants or contracts for some of the projects listed in *Current Projects*, financing for the majority of projects comes from other Government and private sources.

SECTION 1

Agriculture and Rural Sociology

BARKLEY, PAUL AND PETER E. HILDEBRAND. Appraisal of Opportunities for Adjusting Eastern Colorado Farming to Prospective Markets. Colorado State University, Department of Economics, Fort Collins, Colo. (Bulletins; started 1957.)

This project studies the effects of changing technology and markets on farms and farm regions, with emphasis on regional development and the use of resources. The primary method of analysis is linear programing.

BARWICK, RALPH P., WILLIAM E. MCDANIEL, AND DANIEL E. KOBLE. Identification of Agricultural Occupations Other Than Farming and the Scientific and Technical Education Needed for Employment and Advancement in These Occupations in Delaware. University of Delaware, School of Agriculture, Department of Agricultural Education, Newark, Del. (Barwick and McDaniel), and Agricultural Education, Delaware State Department of Public Instruction, Newark, Del. (Koble). (Dissertation; started 1964; EDC, 1965.)

The project will identify, by job title, present and emerging nonfarming agricultural occupations for which scientific, technical, and vocational agricultural education is needed. It will establish information on annual entry opportunities and will determine such factors as: (*1*) number of employees in these occupations now and in the future; (*2*) competence needed for entry into, and common to, occupational groups; (*3*) characteristics of such occupations; and (*4*) continuing educational needs of workers.

A stratified random sample of agribusinesses in the State of Delaware will be used for the study, and a representative of each of the businesses will be interviewed.

NOTE: In each project reference the initials EDC stand for estimated date of completion.

BEAL, GEORGE M., *see* KLONGLAN, GERALD E., *et al.*

BISHOP, C. E., *see* SUTHERLAND AND BISHOP.

BLACKMORE, JOHN, YOSHIHIRO MARUYAMA, AND EARL I. FULLER. **Economic Assessment of the Competitive Position and Potential Supply Response of Massachusetts Dairy Farmers.** University of Massachusetts, College of Agriculture, Department of Agriculture and Food Economics, Amherst, Mass. (Bulletin; started 1963; EDC, 1965.)

The effects of varying levels of technical proficiency in agronomy practices will be incorporated into this study of western Massachusetts and Connecticut farms. The study will include: (*1*) linear programing to study the potential adjustments in dairying; (*2*) determination of typical farm situations through a regional adjustment model; (*3*) incorporation of data on processing, transportation, and demand structure for dairying into an aggregate model; and (*4*) a quadratic programing procedure for aggregation.

BOHLEN, JOE M., *see* KLONGLAN, GERALD E., *et al.*

BOLTON, BILL, *see* WIEGMANN, FRED H., *et al.*

BOTTUM, JOHN S. AND MERVIN G. SMITH. **Analysis of the Impact of Past and Present Agricultural Policies on the Quantities of Agricultural Products Marketed, Channels Used in Marketing, and Market Structure in Ohio.** The Ohio State University, School of Agricultural and Home Economics, Department of Agricultural Economics and Rural Sociology, Columbus, Ohio. (Bulletins, articles; started 1960; EDC, 1964.)

This is a study of Government policies on agriculture, particularly the influence of alternative programs and their relationship to developing technology in agriculture and the influence of farm policies on agricultural organization and market structure. The study uses available secondary data as well as necessary primary data collected by random sampling.

BROWDER, GORDON. **Technological Change and the Rural Farm Population of Montana.** Montana State University, Department of Sociology, Anthropology, and Social Welfare, Missoula, Mont. (Article; started 1964; EDC, 1965.)

The article will analyze population changes among farmers in Montana County as they relate to increases in mechanization of agriculture. Most of the data will be obtained from censuses of population and agriculture.

BURCH, THOMAS A., *see* **HUBBARD JOHN W.**, *et al.*

BURROWBRIDGE, DONALD, *see* **HOEPNER, PAUL H.**, *et al.*

BUTLER, CHARLES P., *see* **HUBBARD, JOHN W.**, *et al.*

CAMPBELL, REX R., *see* **LIONBERGER AND CAMPBELL.**

CARD, DANA G., *see* **RUDD, ROBERT W.**, *et al.*

CHAMBLISS, R. LEE, JR., *see* **HOEPNER, PAUL H.**, *et al.*

CHAPPELL, JOSEPH S. AND WILLIAM D. TOUSSAINT. **An Economic Analysis of the Influences of Various Harvesting and Curing Methods on the Grade-Price Relationships and on Harvesting and Curing Costs of Flue-Cured Tobacco.** North Carolina State of the University of North Carolina at Raleigh, School of Agriculture, Department of Agricultural Economics, Raleigh, N.C. (Bulletin; started 1963; EDC, 1965.)

Labor information and cost data on automatic stringing machines have been obtained from farmers. The study will also use available data from previous studies on bulk curing and conventional harvesting, as well as information on price of tobacco for 1963 and 1964 obtained from a sample of farmers.

CHARLTON, J. L. **Analysis of the Social and Economic Effects of the Movement of Farm People.** University of Arkansas, School of Agriculture, Department of Agricultural Economics and Rural Sociology, Fayetteville, Ark. (Bulletin; started 1960; EDC, 1964.)

Part of this study pertains to the relationship of technological advances to the movement of people from farms in the State of Arkansas. The first phase of the study focuses on the county as the unit for correlation analysis and utilizes census data. In a later phase, family and farm records will be obtained for complementary analysis of the effects of technology upon population change.

COCHRANE, WILLARD W. The City Man's Guide to the Farm Problem. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Book; started 1964; EDC, 1965.)

This book will describe the technological revolution going on in farming and will point out the implications of the revolution for resource adjustments, surplus production, and farm prices and incomes. The commercial and low-production sectors of farming will be considered separately.

COLEMAN, A. LEE, *see* COUGHENOUR, CHARLES M., *et al.*

CONKLIN, HOWARD E. A Study of the Extent and Intensity of Farming in Eastern New York State. Cornell University, College of Agriculture, Department of Agricultural Economics, Ithaca, N.Y. (Maps, bulletins; started 1964; EDC, 1967.)

The purpose of the study is to determine the impacts of technological change and expansion on urban areas and employment opportunities in agriculture in eastern New York and to forecast changes in farming arising from these factors. Field examinations supplemented by airphoto interpretation, soil maps, climatic information, farm management data, information on new technology, and related materials will provide the basis for mapping areas not now used for farming. Existent farms will be placed in three classes in terms of anticipated changes in the businesses located on them during the next 25 years.

COUGHENOUR, CHARLES M., A. LEE COLEMAN, AND N. P. PATEL. Factors Affecting the Spread of Improved Farm Practices in Kentucky. University of Kentucky, Agricultural Experiment Station, Department of Rural Sociology, Lexington, Ky. (Bulletins, articles; started 1949.)

This study investigates the social functions of different interpersonal ties in the communication of technological ideas in farming and the consequences of dominant and subordinate types of enterprise in an area for the development of related social and economic institutions. The effects on farmers' attitudes toward future success in their chosen enterprise are also being investigated.

COUTU, A. J. *see* IHNEN, L. A., *et al.*

DAHL, DALE C., *see* FIENUP AND DAHL.

DAKIN, RALPH E., *see* MCKINNEY, R. D., *et al.*

DEAN, GERALD W., TRIMBLE, R. HEDGES, AND J. EDWIN FARIS. Changes in Technology and Practices, Farm Organizational Characteristics, Resource Availability, and Prices in Relation to Farm Costs and Earnings. University of California, College of Agriculture, Department of Agricultural Economics, Davis, Calif. (Bulletins, articles, reports; started 1958; EDC, 1964.)

The objective of this project is to provide investigational machinery to deal with limited-scope problems in relation to changes in crop and livestock technology, relative factor requirements, input-output relationships, and costs at all levels. The project uses farm budgeting, linear programing, and regression analysis as the principal computational methods.

DOUGLAS, LOUIS H., *see* **MCKINNEY, R. D.**, *et al.*

EICHHORN, R. L., *see* **MORRIS, W. H. M.**, *et al.*

EISGRUBER, L. M., *see* **MORRIS, W. H. M.**, *et al.*

FARIS, J. EDWIN, *see* **DEAN, GERALD W.**, *et al.*

FIELDER, LONNIE L., JR., *see* **WIEGMANN, FRED H.**, *et al.*

FIENUP, DARRELL F. AND DALE C. DAHL. Minnesota Agribusiness Structural Adjustment in the Agribusiness Sector of the Minnesota Economy. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Bulletin, articles; started 1961; EDC, 1964.)

This project studies the structural changes in agriculture brought about by technological advance, i.e., fewer, larger, and more specialized farm units. Corresponding changes and effects have taken place in the businesses serving agriculture. The study relates the changing composition, volume, and variability of business and employment trends in these agribusiness components to the changing structure and types of agriculture found in Minnesota.

FULLER, EARL I. Economics of Feed Handling on Dairy Farms. University of Massachusetts, College of Agriculture, Department of Agriculture and Food Economics, Amherst, Mass. (Bulletin; started 1963; EDC, 1965.)

This is an evaluation of technological data from engineering investigations and from farm studies of the economic implications of alternative systems of feed handling in selected types of dairy farms. New technologies of feed handling by innovators are being sought, and an economic evaluation of alternative technologies and sets of technologies is planned. The study will

attempt to devise productive schemes that will incorporate unknown technical innovators as they develop in the future.

FULLER, EARL I., *see* BLACKMORE, JOHN, *et al.*

FULLER, GERAL, *see* PHIPPS, LLOYD J., *et al.*

GIBSON, WILLIAM L. AND HARRY M. LOVE. **Tenure Adjustments in Farm Consolidation.** Virginia Polytechnic Institute, School of Agriculture, Department of Agricultural Economics, Blacksburg, Va. (Bulletin; started 1964.)

This is a study of the trend in farm consolidation in the United States, particularly in Virginia, resulting from newly developed technology. It will emphasize the forms of tenure under which consolidation occurs, the effects upon efficiency of agricultural production, the degree of fragmentation of farm units, and the economic and social impacts on farm communities.

GILLIAM, HENRY C., *see* HUBBARD, JOHN W., *et al.*

HAGAN, ALBERT R. **Family Farm Adjustments To Meet the Impact of Economic, Technological, and Sociological Change.** University of Missouri, College of Agriculture, Department of Agricultural Economics, Columbia, Mo. (Bulletins; started 1959; EDC, 1964.)

This is a study of adjustments to change of all the farm families in a township area over a period of years. Changes include the reorganization of farm resources, methods, and techniques; and the failure of some families to adapt has led to unfavorable effects on resource productivity, conservation, farm income, and family living. Detailed farm budgeting and a current inventory of family resources and goals are related to trends in land and resource use and the problems of current adjustments.

HASSLER, JAMES B. AND HOWARD W. OTTOSON. **Effects of Technological Changes on Interarea Competition for the Livestock-Feed-Wheat Sectors of the Midwest.** University of Nebraska, School of Agriculture, Department of Agricultural Economics, Lincoln, Nebr. (Bulletin; started 1963; EDC, 1966.)

The study is evaluating the separate effects of major technological changes, such as the development of synthetic fertilizers and improvements in animal breeding and nutrition, transportation, and processing and marketing, for differential magnitudes by areas of specialization. The evaluation will assess the derived impacts on comparative advantage, income, and resource values.

Hathaway, Dale E. Economic Adjustment of Agriculture to Industrialization Growth and Change in the Nonfarm Economy. Michigan State University of Agriculture and Applied Science, School of Agriculture, Department of Agricultural Economics, East Lansing, Mich. (Articles; started 1956.)

The purpose of the project is to determine how agriculture, particularly the farm labor force, adjusts to changes in the nonfarm economy. One phase of the investigation deals with the effects of technological change.

Hedges, Trimble R., *see* **Dean, Gerald W.,** *et al.*

Hemp, Paul, *see* **Phipps, Lloyd J.,** *et al.*

Henderson, Donald C., *see* **Stucky and Henderson.**

Hess, Carroll V. Coordinated Egg Production and Marketing Programs in Minnesota. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Bulletin; started 1961; EDC, 1965.)

After a study of various aspects of egg production and marketing in Minnesota, including technology, a framework will be suggested to synthesize coordinated egg production-marketing programs, which will take into account the most efficient technological and organizational procedures.

Hildebrand, Peter E., *see* **Barkley and Hildebrand.**

Hoepner, Paul H., R. Lee Chambliss, Jr., and Donald Burrowbridge. Optimum Allocation of Farm Resources in Northeastern Virginia. Virginia Polytechnic Institute, School of Agriculture, Department of Agricultural Economics, Blacksburg, Va. (Bulletin; started 1961; EDC, 1964.)

The study will: (*1*) determine the farm resources available in the northeastern counties of Virginia and the uses being made of them, (*2*) estimate the allocation of present and obtainable resources which would maximize net income under present and anticipated technological changes, and (*3*) consider and evaluate alternative methods of harvesting, drying, storing, and using corn. Some 200 farmers in the northeastern counties of Virginia were contacted in 1961 to obtain information on present resources and their uses. In addition, a number of farmers were asked to keep records on labor and other costs for different methods of harvesting, drying, storing, and using corn. From these records, the study will develop a number of different budgets for crop and livestock enterprises under present and future technology to determine the best uses to which typical resource situations might be put to maximize farm income. The typical farm resource situations are being developed on the basis of model groups as indicated by the survey findings.

Hoglund, C. Raymond. Adjustments in Dairy Farming To Meet Changing Conditions. Michigan State University of Agriculture and Applied Science, Agricultural Experiment Station, Department of Agricultural Economics, East Lansing, Mich. (Started 1955.)

This study inquires into the strong pressures on dairy enterprises to adjust operations to changing technologies and market demand. The application of new techniques and their effectiveness in reducing the cost of milk production will be investigated. Particular attention will be given to adjustment opportunities for improved farm practices, new technological innovations, and economy of scale.

———. Economic Analysis of Improved Technology in Producing and Harvesting Forage Crops. Michigan State University of Agriculture and Applied Science, Agricultural Experiment Station, Department of Agricultural Economics, East Lansing, Mich. (Report; started 1958; EDC, 1968.)

The objectives of the study are: (*1*) to determine the level of investment and annual costs of growing different combinations of forage and grain crops on land of varying productivity and (*2*) to determine the economic optimum in different harvesting and storage systems for farms with varying physical resources.

Hubbard, John W., Charles P. Butler, Thomas A. Burch, Henry C. Gilliam, and W. J. Lanham. An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of South Carolina To Meet Changing Conditions. Clemson Agricultural College, College of Agriculture and Biological Sciences, Department of Agricultural Economics and Rural Sociology, Clemson, S. C. (Bulletin, papers, articles; started 1963; EDC, 1968.)

This project will provide guides to farmers for choosing among alternative production opportunities, especially as these opportunities are affected by changes in technology and other factors. The most profitable enterprise combination for the selected systems of farming will be determined by using budgeting techniques and linear programing.

Ihnen, L. A., William D. Toussaint, and A. J. Coutu. An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions. North Carolina State of the University of North Carolina at Raleigh, School of Agriculture, Department of Agricultural Economics, Raleigh, N. C. (Bulletin; started 1958.)

The purpose of this project is to provide guides to farmers for choosing among alternative production opportunities, especially as those opportunities are affected by changes in prices and technology. The study analyzes the effects of acreage allotments in representative farm situations, and evaluates minimum resource requirements for specified levels of farm incomes. (See also the Sutherland-Bishop study, which is similar in substance but focuses on a different geographic area.)

JENSEN, HARALD R. AND CARMEN O. NOHRE. Production Adjustments and Supply Response for Hog and Beef Cattle Production in Minnesota. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Bulletins, articles; started 1961; EDC, 1966.)

The project will estimate: (*1*) supply responses for hogs and beef and (*2*) resource requirements and production adjustments for hogs and beef in representative farm situations. Random samples of farms will be stratified by type and size, and farmers in the samples will be interviewed for information on resource availabilities, production practices, technology, and resource use. This information will be used to describe the base from which adjustments take place.

JENSEN, HARALD R., *see* **SUNDQUIST AND JENSEN.**

KEARL, WILLIS G. AND DELWIN M. STEVENS. Economics of Livestock Production and Ranch Management in the Plains of Wyoming. University of Wyoming, School of Agriculture, Agricultural Economics Division, Laramie, Wyo. (Bulletins, articles; started 1959; EDC, 1964.)

The primary objective of the project is to evaluate the economic effects of science and technology at the firm level. One aspect of the study deals with cattle price behavior and decision-making by ranchers. Other aspects consider the effects of adoption of new techniques or management practices on ranches in the Great Plains. The principal method is budgeting of typical ranch situations, and some linear programing and application of decision theory may also be used.

KLINE, RALPH G. Economic Appraisal of Farming Adjustment Opportunities in Southside Virginia. Virginia Polytechnic Institute, School of Agriculture, Department of Agricultural Economics, Blacksburg, Va. (Bulletins; started 1960; EDC, 1964.)

The purpose of this project is to provide guides to farmers when choosing among alternative production opportunities, especially as those opportunities are affected by changes in technology and other factors. By using budgeting techniques and linear programing, the study will determine the most profitable enterprise combination for selected systems of farming.

KLONGLAN, GERALD E., GEORGE M. BEAL, AND JOE M. BOHLEN. Role of a Free Sample Offer in the Adoption of a Technological Innovation. Iowa State University of Science and Technology, College of Agriculture, Department of Economics and Sociology, Ames, Iowa. (Bulletin, papers, articles; started 1958; EDC, 1965.)

This study concerns the evaluation of a communication method used to expedite the adoption of a new farm practice. On the theoretical level, the study concentrates on the decision-making process of the sender of information in selecting a message and media combination for introducing a new product to his potential market. The empirical part of the investigation includes a comparison between potential users of the product who responded to the communication method and potential users who failed to respond.

KNIGHT, DALE A., *see* MCKINNEY, R. D., *et al.*

KOBLE, DANIEL E., *see* BARWICK, RALPH P., *et al.*

KORZAN, GERALD E. **Impact of Changes in Market Structure and Technology on the Beef Cattle Industry.** Oregon State University, Agricultural Experiment Station, Department of Agricultural Economics, Corvallis, Oreg. (Reports; started 1962; EDC, 1967.)

This project is investigating the impact of technological developments as they may occur on factors such as market organization and aggregate supply and profits. Changing marketing patterns are being analyzed to determine their impact on the beef cattle industry, and changes such as selling on the basis of guaranteed dressing percentage, growth of feed lot operations, feeding "reputation cattle," placing of livestock auctions, and focusing the price-making process are being evaluated. The study includes an analysis of the beef cattle cycle to explain to feeders and others in the industry why wide variations in margins and profits may occur from one time period to another. The impact of changes in technology such as artificially tendered beef and the dual grading system is being analyzed to determine adjustments in the industry.

KREBS, ALFRED H., *see* PHIPPS, LLOYD J., *et al.*

KRIESEL, HERBERT C. **Some Changes in Interregional Competitive Relationships for Broilers and Eggs With Particular Reference to West Virginia.** West Virginia University, College of Agriculture, Forestry, and Home Economics, Department of Agricultural Economics and Rural Sociology, Morgantown, W. Va. (Bulletin; started 1962; EDC, 1964.)

Part of this study analyzes changes in the technology of transportation and broiler production and the effect of such changes on comparative regional advantages as well as on total cost structures.

LAGRONE, WILLIAM F., *see* PLAXICO, JAMES S., *et al.*

LAGRONE, WILLIAM F., *see* WALKER AND LAGRONE.

LANHAM, W. J., *see* HUBBARD, JOHN W., *et al.*

LIONBERGER, HERBERT F. AND REX R. CAMPBELL. Social and Cultural Factors Affecting the Dissemination and Use of Scientific Farm Information by Missouri Farmers. University of Missouri, College of Agriculture, Department of Rural Sociology, Columbia, Mo. (Bulletins, papers; started 1950.)

Continuing studies will investigate uses of communications media by farmers for purposes of obtaining scientific agricultural information and knowledge of farm practices. The factors conditioning the use of such information, particularly social and cultural factors, are considered. Processes by which scientific information and practices become diffused throughout the local community through the avenues of interpersonal relations are also investigated along with the role of the local innovator and the "progressive" and successful farmer. Included in the research will be a study of the involvement of community leaders in decisions of civic improvement at the community level.

LOVE, HARRY M., *see* GIBSON AND LOVE.

MAKI, WILBER R. Effects of Agricultural Adjustment on the Growth of Farm-Related Business. Iowa State University of Science and Technology, School of Agriculture, Department of Economics and Sociology, Ames, Iowa. (Bulletin, articles; started 1961; EDC, 1965.)

Two models will be used to evaluate the industrial development prospects in Iowa. The first is a 25-sector input-output model of the Iowa economy. Capital and financial coefficients are being developed as part of a second model of business growth, which is an extension of the Iowa input-output model along the lines suggested by R. Stone's input-output models of the United Kingdom. Emphasis will be on the impacts of recent innovations in transportation and marketing.

MARUYAMA, YOSHIHIRO, *see* BLACKMORE, JOHN, *et al.*

MCDANIEL, WILLIAM E., *see* BARWICK, RALPH P., *et al.*

MCKINNEY, R. D., RALPH E. DAKIN, LOUIS H. DOUGLAS, DALE A. KNIGHT, AND WAYNE C. ROHRER. Kansas Area Development. Kansas State University of Agriculture and Applied Science, School of Agriculture, Department of Economics and Sociology, Manhattan, Kans. (Bulletins, paper; started 1960.)

The study concerns the effects of technological change on economic opportunities in a number of agriculture trade areas under investigation. Adaptive strategies available to local businesses are being evaluated in terms of their contributions to maximizing per capita income of the trade area. The principal social, economic, and political consideration relevant to planning of resource use are also being analyzed.

MOORE, DONALD S., K. R. TEFERTILLER, AND R. H. ROGERS. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Texas To Meet Changing Conditions. Texas A&M University, School of Agriculture, Department of Agricultural Economics and Sociology, College Station, Tex. (Bulletin; started 1958; EDC, 1964.)

The purpose of the project is to determine the nature and magnitude of adjustments needed in specific farm situations to achieve the most profitable systems of farming under a range of conditions and technologies. Linear programing methods are used to determine optimum enterprise combinations.

MORRIS, W. H. M., R. L. EICHHORN, AND L. M. EISGRUBER. Status and Rehabilitation of the Farm Cardiac. Purdue University, College of Agriculture, Department of Agricultural Economics, Lafayette, Ind. (Articles; started 1955; EDC, 1964.)

The project will develop systems of farm operations consistent with the energy potential and other resources of cardiac-impaired farmers. It will involve separate studies of managerial ability, decision-making, and acceptance of technological change.

NOHRE, CARMEN O., *see* JENSEN AND NOHRE.

OTTOSON, HOWARD W., *see* HASSLER AND OTTOSON.

PARTENHEIMER, E. J. AND P. L. STRICKLAND, JR. An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region To Meet Changing Conditions—Revised. Auburn University, Agricultural Experiment Station, Department of Agricultural Economics, Auburn, Ala. (Bulletins, articles; started 1963; EDC, 1968.)

The objectives of the study are: (*1*) to determine the nature and magnitude of farming adjustments needed to achieve the most profitable system of farming under alternative prices of selected commodities and to estimate the effects of these adjustments on the aggregate output and income for new and previously selected geographic areas in the southern region; (*2*) to consider the implications of alternative levels of acreage allotments on aggregate output and income for selected areas of the region; (*3*) to examine the impact of price changes of selected factors of production on the minimum land requirements for specified levels of income under alternative combinations of allotment level and product price; and (*4*) to estimate farm numbers in the selected areas which are consistent with the minimum resource requirements under alternative levels of product and factor prices, allotments, and income.

PATEL, N. P., *see* COUGHENOUR, CHARLES M., *et al.*

PAWSON, WALTER W., THOMAS M. STUBBLEFIELD, FRANK WIERSMA, AND BRUCE R. TAYLOR. **Economics of Adjustments in Beef Production in Arizona.** University of Arizona, School of Agriculture, Department of Agricultural Economics, Tucson, Ariz. (Bulletins; started 1959; EDC, 1967.)

The study investigates factors associated with economic trends and interregional competition related to cattle feeding in Arizona, including population growth, shifts in consumer demands, and regional differences in cattle prices, feed prices, feeding efficiency, nonfeed costs, and other factors. Differences in feeding efficiency and in nonfeed costs are associated with scientific and technological advances. The project also includes research on economies of scale in the cattle feeding industry in Arizona, based on an intensive study of the cost structure of selected feedlots of different sizes.

PETERSON, GUSTOF A. AND SYDNEY D. STANIFORTH. **Adjustments in Dairy Farming in Wisconsin Too Meet Changing Conditions.** University of Wisconsin, School of Agriculture, Department of Agricultural Economics, Madison, Wis. (Bulletin, started 1963; EDC, 1966.)

This study seeks to appraise the input of dairy technology, the output of dairy products, and the organization of dairy farms in Wisconsin. It will provide information on the needs and opportunities for adjusting agriculture in Wisconsin. Alternative opportunities for adjustment will be studied to indicate needs for changing the size of business and capital requirements and to show methods of increasing farm income.

PHIPPS, LLOYD J., ALFRED H. KREBS, PAUL HEMP, J. ROBERT WARMBROD, AND GERAL FULLER. **Technical Education in and for Rural Areas.** University of Illinois, School of Education, Vocational-Technical Department, Urbana, Ill. (Monograph, articles; started 1962; EDC, 1965.)

The purpose of this project is to identify present and emerging technical occupations in representative rural areas and in industries serving rural areas. The study will also attempt to determine what technical occupations are suitable and available for persons with rural backgrounds. The project uses basic data collected for curriculum development. The method of study includes job analysis and field experiments.

PLAXICO, JAMES S., ODELL L. WALKER, LUTHER G. TWEETEN, AND WILLIAM F. LAGRONE. **Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Oklahoma To Meet Changing Conditions.** Oklahoma State University of Agriculture and Applied Science, School of Agriculture, Department of Agricultural Economics, Stillwater, Okla. (Bulletins, articles, dissertations; started 1958; EDC, 1968.)

The study will estimate: (*1*) the nature and magnitude of farming adjustments needed to achieve the most profitable systems of farming under improved technology and alternative prices, (*2*) the effects of these adjustments on aggregate output and income for selected Oklahoma areas, and (*3*) the intermediate- and long-term adjustments. Results of the study will be used to relate regional supplies of products to national and net regional demand.

Polopolus, Leo and Fred H. Wiegmann. Economic Potential for Additional Vegetable Processing Facilities in South Central Louisiana. Louisiana State University and Agricultural and Mechanical College, School of Agriculture, Department of Agricultural Economics, Baton Rouge, La. (Bulletin; started 1963; EDC, 1966.)

The principal objective of this study is to explore the possibility of alleviating an income and employment problem in South Central Louisiana by creating additional vegetable processing facilities. It will also place considerable emphasis on determining the economic feasibility of establishing new technology in vegetable processing.

Raup, Philip M. Tenure Arrangements for Low-Equity Tenants. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Bulletin; started 1962.)

The study is investigating various forms of leasing arrangements used to enable farm operators with limited capital resources to adapt farm enterprises to changing technological, economic, and social conditions. It emphasizes case studies based on field interviews.

Rieck, Robert, *see* **Wilkening and Rieck.**

Rogers. R. H., *see* **Moore, Donald S.,** *et al.*

Rohrer, Wayne C., *see* **McKinney, R. D.,** *et al.*

Rudd, Robert W., D. Milton Shuffett, and Dana G. Card. Development Patterns in Kentucky Agriculture. University of Kentucky, School of Agriculture and Home Economics, Department of Agricultural Economics, Lexington, Ky. (Bulletin; started 1964; EDC, 1968.)

The project will study technological developments which have brought great changes to Kentucky farms, including: (*1*) larger total output produced by fewer farmers and farms but with increased capital requirements of the industry, and (*2*) continuous changes and economic pressures within the industry which force constant farm adjustment and change. Long-run trends will be established for the major commodities produced in Kentucky, and the State's agricultural resources will be appraised in terms of potential and competitive relationship to other areas. Areas of advantage and disadvantage will be identified by commodity lines, and forecasts will be made for changes in the major outputs in Kentucky for the year 1975. Least-squares regression analysis will be the principal tool for measuring the rate of trends.

SCHLEBECKER, JOHN T. **Scientific and Technical Development of American Agriculture.** Iowa State University of Science and Technology, Department of History, Government, and Philosophy, Ames, Iowa. (Book; started 1959; EDC, 1966.)

This history of American agriculture from 1607 to 1960 includes the social, economic, and political consequences of scientific and technical advances in agriculture. The work traces the historical development of scientific and technical innovations, primarily those related directly to agriculture and to some extent those indirectly related, such as in food processing, refrigeration, and steel manufacture. The methodology is typically historical.

SHAFER, CARL. **Marketing Structure for Broilers in Texas.** Texas A&M University, School of Agriculture, Department of Agricultural Economics and Sociology, College Station, Tex. (Bulletin; started 1963; EDC, 1964.)

The study will determine impacts on, and the probable form of, organization of the broiler industry as a result of recent technological advances. An economic analysis is also being made of the likely influence on the price behavior of the product.

SHUFFETT, D. MILTON, *see* RUDD, ROBERT W., *et al.*

SINCLAIR, ROBERT O. **Effects of Farm Consolidation and Abandonment on Rural Vermont Communities.** University of Vermont and State Agricultural College, College of Agriculture and Home Economics, Department of Agricultural Economics, Burlington, Vt. (Bulletins, articles; started 1962; EDC, 1965.)

This project will: (*1*) collect and analyze statistics relating to the decrease in the number of commercial farms in selected areas of Vermont and in the State as a whole, (*2*) determine the causes of changes in the ownership pattern, (*3*) determine specifically the relative importance of abandonment of farms and consolidation of farmland as factors in the decrease in farm numbers, (*4*) study the mobility of farm families resulting from the decrease in the number of farms, and (*5*) analyze the effects of abandonment or consolidation on the social and economic structure of the communities studied and determine how rural communities can best adjust to these changes.

Projections will be made on the probable trends in number and size of farm units, and recommendations will be presented on how rural communities can alleviate the adjustment problems. The method of investigation will include a comparison and analysis of Census data from 1945 to 1959, detailed study of selected towns, and personal interviews.

SMITH, MERVIN G., *see* BOTTUM AND SMITH.

STANIFORTH, SYDNEY D., *see* PETERSON AND STANIFORTH.

Stevens, Delwin M., *see* **Kearl and Stevens.**

Strickland, P. L., Jr., *see* **Partenheimer and Strickland.**

Stubblefield, Thomas M., *see* **Pawson, Walter W.**, *et al.*

Stucky, H. R. and Donald C. Henderson. Resources Inventory and Structure of Agriculture. New Mexico State University, College of Agriculture and Home Economics, Department of Agricultural Economics and Agricultural Business, University Park, N. Mex. (Bulletin; started 1963; EDC, 1965.)

The project will identify, tabulate, and evaluate, by county, New Mexico's agricultural resources and collect data on past and present contributions to the State's economy. Future resource use and economic contributions in agriculture will be estimated, and the effects of current and foreseeable technological development will be considered.

Sundquist, Wesley B. and Harald R. Jensen. Adjustments of Farm Production and of the Structure of Farming in Minnesota to Economic Change. University of Minnesota, Institute of Agriculture, Department of Agricultural Economics, St. Paul, Minn. (Bulletins; started 1959; EDC, 1965.)

The first phase of this study estimates how dairy-hog farmers can be expected to respond, in production of milk and pork, to varying prices for these products on the assumption that they are profit maximizers subject to certain resource restrictions. In this phase, information will be forthcoming to farmers on the kind and magnitude of production adjustments, including alternative technologies, needed to increase income. Current emphasis is on the regional aspects of this study.

The principal procedure of the second phase of the project traces the path of development of a random sample of dairy farmers in Minnesota. Continuous data on expectations of farm managers, degree of realization of these expectations, and reasons for nonrealization are being obtained for a 4-year period. Characteristics of farm operators and their firms are studied to predict rate of reinvestment and development.

Sutherland, J. Gwyn and C. E. Bishop. An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions. North Carolina State of the University of North Carolina at Raleigh, School of Agriculture, Department of Agricultural Economics, Raleigh, N. C. (Bulletin; started 1963; EDC, 1968.)

The purpose of this project is to provide guides to farmers for choosing among alternative production opportunities, especially as those opportunities are affected by changes in prices and technology. The effects of acreage allotments in representative farm situations are being analyzed, and minimum resource requirements for specified levels of farm incomes are being evaluated. (See also the Ihnen-Toussaint-Coutu study, which is similar in substance but focuses on a different geographic area.)

TAYLOR, BRUCE R., *see* **PAWSON, WALTER W.**, *et al.*

TEFERTILLER, K. R., *see* **MOORE, DONALD S.**, *et al.*

TOLLEY, G. S. Determinants of Change in Agriculture. North Carolina State of the University of North Carolina at Raleigh, School of Agriculture, Department of Agricultural Economics, Raleigh, N. C. (Bulletin; started 1960.)

The objectives of this project are: (*1*) to gain understanding of the effects of forces contributing to change in agriculture, including regional competitive advantages in relation to total U.S. agriculture; (*2*) to work out those forces within areas such as population, technical farming advances, and industrialization; and (*3*) to make predictions about the supply of particular agricultural commodities in order to effect major adjustments in agricultural regions as a whole.

TOUSSAINT, WILLIAM D., *see* **CHAPPELL AND TOUSSAINT.**

TOUSSAINT, WILLIAM D., *see* **IHNEN, L. A.**, *et al.*

TWEETEN, LUTHER G., *see* **PLAXICO, JAMES S.**, *et al.*

VOSS, LEONARD A. Effect of Coordinated Egg Production-Marketing Technology Upon Market Channels and Institutions in Missouri and the North Central States. University of Missouri, College of Agriculture, Department of Agricultural Economics, Columbia, Mo. (Bulletins; started 1961; EDC, 1965.)

This study will determine the nature, extent, and direction of alternative methods of coordinated egg production and marketing programs in Missouri by segments of the poultry industry. The results of the study will be used to suggest a framework for coordinated egg production-marketing programs and will take into consideration technological and organizational procedures for given levels of service. The method of study will include interviews and surveys.

WALKER, ODELL L. Economic Efficiency in the Production of Field Crops in Oklahoma. Oklahoma State University of Agriculture and Applied Science, School of Agriculture, Department of Agricultural Economics, Stillwater, Okla. (Bulletins, articles; started 1959; EDC, 1964.)

The study estimates costs, production responses, and returns resulting from the adoption of new technologies which affect crop production. The specific technologies studied are in the fields of fertilization, irrigation, insecticides, desiccants, defoliants, and pre- and post-emergence herbicides. This research provides a basis for estimating changes in farm organization and agricultural production which result from technological change. The results will serve to guide farmers in making production and organization decisions.

WALKER, ODELL L. AND WILLIAM F. LAGRONE. **Economic Appraisal of Farming Systems in the Great Plains.** Oklahoma State University of Agriculture and Applied Science, School of Agriculture, Department of Agricultural Economics, Stillwater, Okla. (Bulletins, articles, dissertation; started 1962; EDC, 1965.)

In this study optimum farm organizations for advanced technology are being estimated for selected resource situations. Alternative adjustment hypotheses for farms, farm-related businesses, and social institutions are being derived for alternative sets of conditions and governmental programs. The project will provide area data for studies of regional economic organizations in the Great Plains.

WALKER, ODELL L., *see* PLAXICO, JAMES S., *et al.*

WARMBROD, J. ROBERT, *see* PHIPPS, LLOYD J., *et al.*

WEST, JERRY G. **Secondary Economies in Concentration of Production of Dairy, Fruit, and Poultry Products.** University of Missouri, College of Agriculture, Department of Agricultural Economics, Columbia, Mo. (Dissertation; started 1960; EDC, 1964.)

Research is being conducted to determine the economies resulting from geographic concentration of production and marketing activities. The study attempts to determine the forces responsible for concentration, as well as the institutional and technological changes in production and marketing, which result in economies of increased concentration. It uses actual cost analyses with data from secondary sources to estimate economies of concentration, and information has been obtained from marketing firms and farmers in the areas involved.

WHITTED, STEPHEN F. **Market Organization and Structure of the Missouri Dairy Industry.** University of Missouri, College of Agriculture, Department of Agricultural Economics, Columbia, Mo. (Bulletins, articles; started 1960; EDC, 1965.)

This research will: (*1*) describe the market organization for fluid milk and manufactured products and determine changes which have been brought about by new technology, integration, and other market innovations; (*2*) assess the economic and social consequences of such changes; and (*3*) propose appropriate public, industry, and company policies. Primary and secondary data on market organization and changes are being collected.

Wiegmann, Fred H., Lonnie L. Fielder, Jr., Willard F. Woolf, and Bill Bolton. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions. Louisiana State University and Agricultural and Mechanical College, School of Agriculture, Department of Agricultural Economics, Baton Rouge, La. (Papers; started 1959; EDC, 1968.)

This project concerns the technological developments and other improvements in production practices which are changing the relative economic advantage of various farm products among farms and production areas. The purpose of the study is to provide guides to farmers in choosing among alternative production opportunities.

Wiegmann, Fred H., *see* Polopolus and Wiegmann.

Wiersma, Frank, *see* Pawson, Walter W., *et al.*

Wilkening, Eugene A. and Robert Rieck. Work and the Decision-Making Role of Wife and Family Goals as Related to Farm Structure and Functioning. University of Wisconsin, School of Agriculture, Department of Rural Sociology, Madison, Wis. (Bulletin, articles; started 1960; EDC, 1965.)

A portion of this study investigates how the involvement of wife and children in farm work and in decisions affects the adoption of technical and management practices. Interviews with 400 to 500 families (husbands and wives) will be conducted to obtain the necessary information.

Williams, Willard F. Economic Effects of Technological and Organizational Changes in Cattle Feeding and Meat Packing. Texas Technological College, School of Agriculture, Department of Agricultural Economics, Lubbock, Tex. (Report, articles; started 1963; EDC, 1965.)

This study will measure the influence or impact of various forces in industry location and interregional competition. Forces to be taken into account include regional differences in rate of technological innovation and economic impacts of specific innovations. The method of investigation will be spatial equilibrium analysis (linear programing).

Woolf, Willard F., *see* Wiegmann, Fred H., *et al.*

For other projects pertaining to
AGRICULTURE AND RURAL SOCIOLOGY

see:

BUTZ, W. T. AND C. W. PIERCE. Milk Assembly, Processing, and Distribution Systems and Practices .... Section 7

EISENBERG, WALTER L. Migratory Farm Labor: A Federal Policy Alternative .... Section 12

GRILICHES, ZVI. Econometric Studies of Technical Change .... Section 2

HATHAWAY, DALE E. Food, Economic Development, and International Relations .... Section 4

LANG, GOTTFRIED O., *et al.* Social and Cultural Change in Sukumaland, Tanganyika .... Section 9

LAVE, LESTER, B. Technological Change: Its Measurement and Conception .... Section 2

POLSON, ROBERT A. Technological Change in the Rural Philippines Section 4

ROGERS, EVERETT M., *et al.* Accelerating the Adoption of Agricultural Innovations .... Section 10

STEPHENSON, MATTHEW A. Theories of Technological Change in the English Classical School .... Section 3

TAYLOR, M. LEE. Study of Two Agribusiness Careers .... Section 8

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SECTION 2

General Economic Analysis

ALKER, HAYWORD R., JR. AND RONALD BRUNNER. Relations Among Scientific, Political, and Economic Development. Yale University, Department of Political Science, New Haven, Conn. (Article; started 1964; EDC, 1965.)

This study will analyse operational indicators of scientific activity and development, including R&D expenditures, the number of scientific periodicals, and manpower and educational training figures, to provide indices of scientific development for about 30 different countries. Causal relationships among these indices and other measures of political and economic development will be tested by using Herbert Simon's method of making causal inferences from correlational data.

ARROW, KENNETH J. AND HOLLIS B. CHENERY. Technology and Resource Allocation. Stanford University, Department of Economics, Palo Alto, Calif. (Started 1961; EDC, 1964.)

This study concerns the influence of technology on resource allocation and productivity. On the theoretical level, the project will concentrate on production functions, with special emphasis on the possibility of inferring production functions for whole industries from those for individual processes. Empirical investigations include international comparisons of inputs and cost structures of the same industry, time series analyses for individual sectors in single countries, and the use of engineering data for processes and plants.

BACON, FRANK R., JR. A Firm-Level Study of the Effect of Science and Technology on Economic Growth. The University of Michigan, Institute of Science and Technology, Industrial Development Division, Ann Arbor, Mich. (Book, Dissertation; started 1964; EDC, 1965.)

The purpose of this research is to develop a better theoretical explanation of the effect of technological inputs on economic outputs at the firm level. Particular emphasis is being given to small- and medium-sized firms. The approach focuses on the information aspect of technical as well as market research activities. Hypotheses generated are tested from data gathered from the detailed case studies of firms in the machine tool and electronics industries in Michigan.

BACON, FRANK R., JR. AND KENNETH R. BAYER. Research Emphasis in Michigan Universities. The University of Michigan, Institute of Science and Technology, Industrial Development Division, Ann Arbor, Mich. (Book; started 1963; EDC, 1964.)

Research activities at The University of Michigan, Michigan State University, Wayne State University, and Michigan Technological University are described in terms of the size, composition, and growth in 10 technical subject areas for the period 1951-63. The composition and growth in these technical subject areas are then compared with the following: (*1*) composition and growth of Michigan, and U.S. manufacturing by SIC 2-digit industry classification, measured in terms of value added by manufacture; (*2*) total research and development performed by different U.S. industries; and (*3*) research expenditures of the Federal government by fields of science. The last two comparisons are based on data from National Science Foundation surveys. Conclusions treat the significance of comparisons and contrasts between research emphasis in Michigan universities and national research activity in light of the present industrial composition of the State and future growth needs.

BAYER, KENNETH R., *see* **BACON AND BAYER.**

BECKER, JAMES F. The Classical (Economic) Philosophy of Science. New York University, School of Commerce, Department of Economics, New York, N.Y. (Book, articles; started 1962; EDC, 1964.)

This study describes the logical foundations and content of the conception of science in the classical school of economics and relates that conception to classical economic doctrine and to contemporary social science.

———. Political Economy of Integration. New York University, School of Commerce, Department of Economics, New York, N.Y. (Book; started 1961; EDC, 1965.)

This study traces the impact of advancing technology and technique, both historically (statistically) and theoretically (mathematically), upon the "power to manage," or "the span of administrative control."

BEHLING, DAVID, *see* **CARTER, ANNE P.,** *et al.*

BEIDEMAN, ELLIOTT, *see* **ZUCKERMAN AND BEIDEMAN.**

BLUMENFELD, ARTHUR A. AND RALPH L. EDGEL. Economic Development of New Mexico Since Statehood: Economic Base Study of New Mexico—Part I. University of New Mexico, College of Business Administration, Bureau of Business Research, Albuquerque, N. Mex. (Monograph, report, article; started 1963; EDC, 1965.)

This is an analysis of the changing structure of economic activity as it is measured by production, employment, income, and, in the postwar period, contribution to gross state product (value added) by each industry group. Particular reference will be made to sources of growth and change as related to changing technology and the growth of scientific research activity in New Mexico.

BLUMENFELD, ARTHUR A. Interindustry Relations Analysis: Economic Base Study of New Mexico—Part II. University of New Mexico, College of Business Administration, Bureau of Business Research, Albuquerque, N. Mex. (Monograph, report, article; started 1963; EDC, 1965.)

An interindustry transactions matrix for 1960 is being developed empirically for some 35 industry groupings. The matrix will be an integral part of measuring economic and direct or indirect social implications of patterns of interindustry relationships which are affected by changing technology and science.

BLUMENFELD, ARTHUR A. AND RALPH L. EDGEL. Projections of the Economy to 1975: Economic Base Study of New Mexico—Part III. University of New Mexico, College of Business Administration, Bureau of Business Research, Albuquerque, N. Mex. (Monograph, report, article; started 1963; EDC, 1965.)

Projections of economic activity to 1975 are being made in terms of gross state product (value added) by industry group, employment, and personal income. The projections are based on projected levels of population and labor force and specific assumptions concerning a sustainable level of natural resource exploitation and the technical requirements for each industry group. Technical assumptions underlining these projections will be provided by experts in the several fields who are conducting the technical studies as participants in other parts of a statewide Resources Development Program.

BROWN, MURRY, *see* CONRAD AND BROWN.

BRUNNER, RONALD, *see* ALKER AND BRUNNER.

BURGESS, FRED H., *see* CASTLE, EMERY N., *et al.*

BUTLER, DARLENE, *see* CARTER, ANNE P., *et al.*

Carter, Anne P., Darlene Butler, and David Behling. **Technological Change in American Industry, 1947–58 and 1970.** Harvard University, Harvard Economic Research Project, Cambridge, Mass. (Book, articles; started 1962; EDC, 1966.)

Changes in input-output patterns between 1947 and 1958 are being analyzed and projections made for about the year 1970. New processes and products and changes in the relative importance of older ones are being studied explicitly in a general disaggregated input-output framework. Attention is currently focused on the inputs of materials and purchased services.

Castle, Emery N., Herbert H. Stoevener, Fred H. Burgess, and Howard Horton. **An Economic Evaluation of Water Pollution Control, Yaquina Bay, Oregon,** Oregon State University, Agricultural Experiment Station, Department of Agricultural Economics, Corvallis, Oreg. (Report; started 1962; EDC, 1966.)

The objectives of the study are: (*1*) to identify the items of economic value that are sacrificed if water pollution is not controlled in a particular case study situation; (*2*) to determine the unit prices and physical quantities of those items of economic value; (*3*) to determine the cost of alternative engineering plans designed to provide for varying degrees of pollution control; (*4*) to relate the above variables in a mathematical model that will permit the unknown physical, biological, and economic data to be isolated; and (*5*) to relate these unknown variables to needed research in the physical, biological, and economic fields.

Chastain, Clark E. **Stimulation of Research and Development.** The University of Michigan, School of Business Administration, Dearborn, Mich. (Monograph; started 1961; EDC, 1965.)

The project will cover the general importance of research and development in the national economy, the relationship of research and development to operations of the firm, the use of incentives to stimulate research and development, and their merits and weaknesses. An appendix will cover defining, measuring, and accounting for research and development. The method of investigation will be by library research and correspondence with agencies stimulating research and development.

Chenery, Hollis B., *see* Arrow and Chenery.

Cleland, Ralph E., *see* Wells, Herman B., *et al.*

Conrad, Alfred H. **Innovations, Size of Firms, and the Observed Production Function.** Harvard University, Graduate School of Business Administration, Cambridge, Mass. (Article; started 1963; EDC, 1966.)

A static theoretical analysis of the distribution of firms over the range of productive efficiency within a specific industry is being reformulated as a dynamic system in which innovations can be introduced and firms can grow or decline in relative size. The study will analyze (*1*) the way in which production possibilities are distributed among the firms in an industry and (*2*) the patterns of introduction and diffusion of technological improvements among young and old firms, large and small firms, and firms with varying vintages of technology in their plants. This analysis will contribute to more useful statistical procedures for defining and estimating production functions and, especially, to a more effective analysis of the role of innovation in the growth of the firm.

The first stage will be in two parts: (*1*) The static model linking the distribution of firms to the production function will be developed into a dynamic model of firm size and technical improvement, and (*2*) empirical work will proceed for estimating distributions of firms according to productive efficiency and such attributes as age and size. From this information, measures of the effectiveness of innovational activity and of policies for firm growth may be developed.

CONRAD, ALFRED H. AND MURRY BROWN. **Empirical Study of Technological Change.** Harvard University, Graduate School of Business Administration, Cambridge, Mass., and George Washington University, School of Business Administration, Washington, D.C. (Brown). (Paper; started 1963; EDC, 1964.)

This research consists of empirical testing of a theoretical model which explicitly links technological change (defined as shifts in the coefficients relating net output to capital and labor inputs) to a set of fundamental variables. The production function is set in a larger system of equations in which the parameters (elasticities of production with respect to the various factor inputs and the constant term) are themselves explained as dependent variable functions of education, research, and development. The empirical testing phase will be applied to the private domestic nonfarm sector in the United States over the period 1890-1960 on an aggregate level. Some effort also will be made to extend the analysis to a disaggregate, specific industry level.

CONRAD, ALFRED H., *see* MARKHAM, JESSE W., *et al.*

EDGEL, RALPH L., *see* BLUMENFELD AND EDGEL.

ENOS, JOHN L. **A Study of the Origin and Growth of New Enterprises.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Books; started 1960; EDC, 1966.)

The study will develop a theory of the origin and growth of firms and present it in the forms of a simulation model, a linearized version, and a simple analytic model. The theory will be tested against the experience of some 20 firms (several of which are research oriented) located in or near Cambridge, Mass., and against an equal number in a developing country.

FELLER, IRWIN, *see* SCHMOOKLER AND FELLER.

Frankel, Marvin. Using Production Functions To Measure Technological Change. University of Illinois, College of Commerce and Business Administration, Bureau of Economic and Business Research, Champaign, Ill. (Started 1963; EDC, 1964.)

This study involves the simulation of economic time series with known basic properties and the analysis of the resulting data by multiple regression techniques to gain a better understanding of alternative hypotheses as they are reflected in production functions and as they are related to technological and other types of change.

Gamble, Hays B., David Raphael, and Roger Saylor. Application of an Input-Output Model to "Microregional" Analysis. The Pennsylvania State University, College of Business Administration, Pennsylvania Regional Analysis Group, University Park, Pa. (Report, articles; started 1964; EDC, 1964.)

An input-output regional accounting model will be developed from data gathered through field interviews of businesses and households in Clinton County, Pa. It will analyze the impact of changes in endogenous and exogenous demand, the introduction of new industries and a new highway system, and the withdrawal of existing industries.

Griliches, ZVI. Econometric Studies of Technical Change. University of Chicago, Department of Economics, Chicago, Ill. (Book, articles; started 1956; EDC, 1965.)

The purpose of the study is to explain increases in U.S. agricultural productivity by developing new measures of improvement in the quality of particular nonhuman and human inputs. Appropriate input indexes will be constructed through the use of coefficients from estimated production functions rather than through the use of market prices as weights.

Griliches, ZVI, *see* Markham, Jesse W., *et al.*

Gruber, William H. The Impact of Technological Change on the Economy. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Started 1963.)

The project analyzes various economic impacts of technological change, including the composition of the labor force. Research has concentrated on the relationship between productivity, education, and changes in the labor force.

Haeberle, William L., *see* Wells, Herman B., *et al.*

HAMBERG, DANIEL. Economics of Research and Development. State University of New York at Buffalo, School of Business Administration, Department of Economics, Buffalo, N.Y. (Books, articles; started 1960; EDC, 1965.)

This is a descriptive, theoretical, and statistical examination of research and development, by sector, from the viewpoints of: (*1*) determinants of research and development at the micro- and macro-economic levels, (*2*) an analysis of inventions by type and source, (*3*) the influence of monopoly and competition, (*4*) incentives for the conduct of research and development, and (*5*) an examination of public policy in the R&D setting.

HARDIN, EINAR. Postwar Changes in Productivity and Their Correlates. Michigan State University of Agriculture and Applied Science, School of Industrial and Labor Relations, East Lansing, Mich. (Article; started 1962; EDC, 1964.)

This study is concerned with the presence, and extent of acceleration, of productivity growth under the impact of modern technology. It will relate productivity growth to changes in output, employment, wages, and prices. The Census of Manufactures and Bureau of Labor Statistics reports furnish most of the data. Data for the Western European countries, especially Scandinavia, will also be included.

HARMSTON, FLOYD K. Technical Change and the Aggregate Production Function. University of Wyoming, Division of Business and Economic Research, Laramie, Wyo. (Dissertation; started 1964; EDC, 1965.)

The objective of the study is to determine the type of production function that best fits trends under the impact of technological change and that can then be used as a basis for forecasting. The impact of technological change, as opposed to the impact of more intensive utilization of capital, will be studied by means of a mathematical model developed by Robert Solow. National data will be obtained largely from Federal publications.

HARTMAN, LOYAL M., *see* SECKLER AND HARTMAN.

HEALD, MORRELL. Mass Production and Managerial Ideologies, or The Social Relations of Business Management. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Book; started 1957; EDC, 1964.)

The project is a historical analysis of the impact of mass production, automation, and related economic and political factors upon American business thought and practice, 1900–1950. The work includes a study of institutional and ideological adaptation to technological and socioeconomic change.

HILDEBRAND, GEORGE H., *see* LIU AND HILDEBRAND.

HIRSCH, WERNER Z., *see* **TOWNSHEND-ZELLNER AND HIRSCH.**

HOLMAN, MARY A., *see* **WATSON AND HOLMAN.**

HORTON, HOWARD, *see* **CASTLE, EMERY N.,** *et al.*

KLINGE, PAUL, *see* **WELLS, HERMAN B.,** *et al.*

LAVE, LESTER B. **Technological Change: Its Measurement and Conception.** Carnegie Institute of Technology, Graduate School of Industrial Administration, Pittsburgh, Pa. (Book; started 1963; EDC, 1965.)

This review of economic literature on the measurement of technological change and its implications will include a series of studies designed to measure technological change in U.S. agriculture and explore the implications of such measurements for structural unemployment, development, and growth.

LAVE, LESTER B. and collaborators. **Innovation and Technological Change.** Carnegie Institute of Technology, Graduate School of Industrial Administration, Pittsburgh, Pa. (Book; started 1964; EDC, 1965.)

A collection of papers from a seminar on the measurement of technological change will be put into book form. The papers explore theoretical issues related to measurement.

LIU, TA-CHUNG AND GEORGE H. HILDEBRAND. **Manufacturing Production Functions in the United States.** Cornell University, Department of Economics, Ithaca, N.Y. (Monograph; started 1962; EDC, 1965.)

A sample survey of manufacturing establishments in New York State is being conducted for the purpose of estimating production functions for some 60 narrowly defined industries. The study will attempt to estimate the respective contributions of capital, labor, technological improvements, and the scale of operation to increase the output of individual industries.

LUCAS, ROBERT E., JR. **Investment in Technological Change.** Carnegie Institute of Technology, Graduate School of Industrial Administration, Pittsburgh, Pa. (Article; started 1964; EDC, 1965.)

The study examines the effects of changing market conditions, as summarized by prices and interest rates, on the rate of improvement of technology in a firm, industry, or sector. Hypotheses on this relationship have been developed and are being tested on time series data for U.S. manufacturing.

MANSFIELD, EDWIN. Econometric Studies of Research and Development. University of Pennsylvania, Wharton School of Finance and Commerce, Department of Economics, Philadelphia, Pa. (Report; started 1962; EDC, 1965.)

An econometric study, including both interindustry and aggregate time series data, will explore the effects of the level of concentration and other factors on the rate of increase of the "index of technology." Empirical studies of selected industries will be made to determine the extent to which technological change has been labor saving or capital saving. Econometric studies will estimate the extent to which technological change in selected industries requires new capital formation. The data will be derived from interviews, records of cooperating companies, and industrial statistics.

———. The Economics of Innovation and Technical Change. University of Pennsylvania, Wharton School of Finance and Commerce, Department of Economics, Philadelphia, Pa. (Books, articles; started 1958; EDC, 1964.)

This project includes: (*1*) a discussion of the economic significance and effects of technical change; (*2*) studies of interfirm and temporal variation in research expenditures in various industries; (*3*) studies of the sources of invention and the lag before application in these industries; (*4*) investigations of the size of innovating firms, the timing of innovation, its effects on investment, and the growth of innovating firms; (*5*) investigations of the imitation process; and (*6*) discussion of various public policies bearing on technical change.

———. Economic Studies of Techincal Change. University of Pennsylvania, Wharton School of Finance and Commerce, Department of Economics, Philadelphia, Pa. (Articles; started 1963; EDC, 1966.)

Studies will be made of the composition of R&D expenditures in various industries, the effects of various characteristics of the firm on the composition of its R&D expenditures, and the effect of the composition of R&D expenditures on the rate of technical change.

MANSFIELD, EDWIN, *see* MARKHAM, JESSE W., *et al.*

Markham, Jesse W., Edwin Mansfield, Frederic Scherer, Jacob Schmookler, Merton Peck, Zvi Griliches, Alfred H. Conrad, and Richard Nelson. The Microeconomic Analysis of Inventive Activity and Technological Change. Princeton University, Department of Economics, Princeton, N.J. (Markham and Scherer); University of Pennsylvania, Department of Economics, Philadelphia, Pa. (Mansfield); University of Minnesota, Department of Economics, Minneapolis, Minn. (Schmookler); Yale University, Department of Economics, New Haven, Conn. (Peck); University of Chicago, Department of Economics, Chicago, Ill. (Griliches); Harvard University, School of Business Administration, Cambridge, Mass. (Conrad). (Book, articles; started 1963; EDC, 1966.)

A theoretical and empirical inquiry is being made into determinants of the size and composition of R&D budgets in the private sector of the economy, the decisional theory relevant to research and development, and methods of measuring the input and output of inventive activity. Methods of investigation include case studies, theoretical model construction, and econometrics.

Martin, E. W., Jr., *see* **Wells, Herman B.**, *et al.*

McCarthy, Michael D. Technical Progress: A Theoretical and Empirical Analysis of Its Effects on Aggregate Output and of Its Sources. Southern Methodist University, Graduate School of Humanities and Sciences, Department of Economics, Dallas, Tex. (Dissertation; EDC, 1964.)

This project is concerned with a number of studies which have shown that a relatively small part of the growth of the constant dollar aggregate output in the United States can be explained by the growth in labor and physical capital inputs. The remainder presumably results from improvements in new physical equipment, improvements in the quality of the work force, or to reorganizations of the existing factors of production known as disembodied technical changes. A number of models are being developed which may be useful in determining the relative importance of such changes.

McConnell, Campbell R. and Wallace C. Peterson. Research and Development: Some Evidence for Small Firms. University of Nebraska, College of Business Administration, Department of Economics, Lincoln, Nebr. (Article; started 1963; EDC, 1964.)

This study examines the frequency with which small firms of under 500 employees engage in research and development. It compares relationships between firm size and the frequency and amount of research and development performed. Also studied will be the basic purposes of research and development in the small firm, and the reasons they are not supported more by these firms. Method of investigation is by mail questionnaire.

McLennan, Kenneth and Harry F. Stark. The Effect of Technological Change on Utility Management. Rutgers, The State University, Bureau of Economic Research, New Brunswick, N.J. (Paper; started 1964; EDC, 1965.)

This study will develop empirical evidence on the relationship between technological investment and productivity, managerial structure, function, and cost.

Merrill, Robert S. Advances in Routine Engineering Design and Their Economic Significance. University of Rochester, Department of Antropology, Rochester, N.Y. (Articles, papers; started 1961; EDC, 1965.)

This project will explore the economic significance of the special bodies of technical knowledge used in routine engineering design. Information obtained from published sources will be supplemented by interviews and the compilation of relevant economic statistics. An examination of the significance of the data obtained for understanding the causes of the advances will be included.

Mesthene, Emmanuel G. and collaborators. University Program on Technology and Society. Harvard University, Interdepartmental Studies, Cambridge, Mass. (Books, monographs, articles, dissertations; started 1964; EDC, 1973.)

This long-range program includes basic and applied research seeking to identify and analyze the primary and secondary impacts and effects of technological change on the economy, business, government, society, and individuals and to suggest programs for anticipating, controlling, and adjusting to such effects. The project will include the various faculties of the University, such as the Schools of Public Administration, Business Administration, Arts and Sciences, and Education, and the Division of Engineering and Applied Physics.

Murdock, John C., *see* Paterson, Robert W., *et al.*

Murry, Donald, *see* Paterson, Robert W., *et al.*

Nelson, Richard, *see* Markham, Jesse W., *et al.*

PATERSON, ROBERT W., JOHN C. MURDOCK, AND DONALD MURRY. Agglomeration Economies in Scientific Research: A Criterion for Allocating Federal Research Expenditures. University of Missouri, School of Business and Public Administration, Research Center, Columbia, Mo. (Books, articles, papers; started 1964; EDC, 1966.)

The research will investigate the cost structure of some existing research facilities to provide basic economic criteria for spatial allocation of scientific research resources. The method of investigation will be a statistical analysis of empirical data and field surveys.

PECK, MERTON, *see* **MARKHAM, JESSE W.,** *et al.*

PETERSON, WALLACE C., *see* **MCCONNELL AND PETERSON.**

PHELPS, CHARLOTTE D., *see* **PHELPS AND PHELPS.**

PHELPS, EDMUND S. AND CHARLOTTE D. PHELPS. A Comparative Study of Economic Growth. Yale University, Department of Economics, New Haven, Conn. (Book; started 1961; EDC, 1964.)

Productivity growth in four advanced countries is being explained in terms of tangible investment and the utilization of scientific manpower.

RABER, NEVIN W., *see* **WELLS, HERMAN B.,** *et al.*

RADNOR, MICHAEL, *see* **RUBENSTEIN AND RADNOR.**

RAFFEL, HELEN, *see* **SUMMERS AND RAFFEL.**

RAPHAEL, DAVID, *see* **GAMBLE, HAYS B.,** *et al.*

ROBERTS, EDWARD B. New Approaches to Project Management. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1964; EDC, 1967.)

The project will explore aspects of effort and cost estimation, program budgeting, and performance measurement and evaluation in R&D projects which form a closed feedback loop of project control central to the R&D

process. Initial studies are investigating impact of incentive contracts on R&D performance and determinants of program results on Mercury and Gemini programs.

RUBENSTEIN, ALBERT H. AND MICHAEL RADNOR. **Organization of Research and Development in Decentralized Companies.** Northwestern University, Technological Institute, Department of Industrial Engineering and Management Sciences, Evanston, Ill. (Book, dissertation, papers; started 1957; EDC, 1965.)

This is a long-term study of the characteristics and behavior of decentralized companies as they affect the inputs, capabilities, and output of research and development. Final stages of primary data collection were completed via field interviews and document examination.

SANDMEYER, ROBERT L. **An Investigation of the Economic and Social Consequences of Automation.** Oklahoma State University of Agriculture and Applied Science, Department of Economics, Stillwater, Okla. (Article; started 1964; EDC, 1965.)

This study is examining automation within the framework of a microeconomic model to determine the net gain or net loss to society under varying assumptions. A microeconomic model is also being used to analyze the effect of automation upon the individual and the firm. The study will define assumptions concerning resource mobility as well as training and retraining programs and determine who should bear the cost of such programs. The social consequences of automation will be examined to determine their influence on the models.

SAYLOR, ROGER, *see* GAMBLE, HAYS B., *et al.*

SCHERER, FREDERIC, *see* MARKHAM, JESSE W., *et al.*

SCHMOOKLER, JACOB AND IRWIN FELLER. **Investment in Partially Obsolete Techniques.** University of Minnesota, Department of Economics, Minneapolis, Minn. (Article; started 1962; EDC, 1964.)

This is a statistical-historical analysis of the competitive advantages offered by old techniques over newer methods of production. The current analysis concerns factors affecting relative rates of adoption of the Draper-Northrop automatic power loom in the New England and Southern cotton textile industries at the turn of the century.

SCHMOOKLER, JACOB, *see* MARKHAM, JESSE W., *et al.*

SECKLER, DAVID AND LOYAL M. HARTMAN. Relationship Between Firm Size and Technology Research. Colorado State University, Department of Economics, Fort Collins, Colo. (Article; started 1964; EDC, 1965.)

This project examines essentially three relationships: (*1*) the effect of firm size on ordinary cost (variation and scale) economies in research and development, (*2*) the influence of budgetary constraints on research and development in a "game theory" context, and (*3*) the hypothesis that, because of interdependencies between R&D projects, the probability of success of, and thus the necessary risk premium on, a given R&D project is within limits a function of the number and size of projects undertaken.

STARK, HARRY F., *see* **MCLENNAN AND STARK.**

STEWART, CHARLES T., JR. A Study of the Role of Changing Regional Patterns of Research and Development and Science-Based Technology in Influencing Regional Development. George Washington University, Department of Economics, Washington, D.C. (Reports; started 1963; EDC, 1965.)

The initial phases of the project consist of a survey of literature on: (*1*) locational requirements of research, development, and science-based economic activities and (*2*) their local socioeconomic impacts. Three intensive case studies—Santa Clara County, Calif.; northern Utah; and Winston-Salem, N. C.—have been initiated. On the basis of these and other available studies and data, an evaluation of local impacts of concentrations of research, development, and research-based manufacturing will be made.

STOEVENER, HERBERT H., *see* **CASTLE, EMERY N.,** *et al.*

SUMMERS, ROBERT AND HELEN RAFFEL. America's Productive Potential. University of Pennsylvania, Wharton School of Finance and Commerce, Department of Economics, Philadelphia, Pa. (Articles; started 1964; EDC, 1966.)

Part of this project will involve the investigation, by means of cross-section analysis, of the way in which new technology affects the production function of the firm and industry. The principal statistical technique will be regression analysis applied to firm data on employment, time-dated capital, and research and development expenditures.

TIMMS, HOWARD L., *see* **WELLS, HERMAN B.,** *et al.*

TOWNSHEND-ZELLNER, NORMAN AND WERNER Z. HIRSCH. **Transformation of New Knowledge Into Commercial Uses.** University of California, Institute of Government and Public Affairs, Los Angeles, Calif. (Started 1963; EDC, 1965.)

The project will attempt to develop concepts that help differentiate between applied science and knowledge transformation and investigate methods of identifying new knowledge that can be coded and stored for effective retrieval.

TYBOUT, RICHARD A. **Economics of Research and Development.** The Ohio State University, College of Commerce and Administration, Department of Economics, Columbus, Ohio. (Book; started 1962; EDC, 1965.)

This volume will contain edited proceedings of the Conference on Economics of Research and Development, The Ohio State University, 1962. The following general subjects were discussed: Economic Calculus of Research and Development, Social Organization for Research and Development, Organization of Research and Development Teams, Public Policy for Military Research and Development, International Specialization in Research and Development, and Invention and the Development of Emergent Nations. Authors of the papers were: Hans P. Bahrdt, Kenneth E. Boulding, Yale Brozen, Paul W. Cherington, Bruno Fritsch, Richard C. Hannenberg, Werner Hildenbrand, John H. Hollomon, George W. James, Burton H. Klein, Helmut Krauch, Edwin Mansfield, Jesse W. Markham, Paul Matussek, Robert S. Merrill, Philip Mullenbach, Richard R. Nelson, Horst Rittel, Albert H. Rubenstein, Hans Sauer, Jacob Schmookler, Richard U. Sherman, Irving H. Siegel, and Richard A. Tybout.

WATSON, DONALD S. AND MARY A. HOLMAN. **Productivity of Federally Financed Research and Development.** George Washington University, Department of Economics, Washington, D.C. (Monographs, articles; started 1963; EDC, 1966.)

This is an investigation of the inventive activity associated with federally financed research and development. The method of investigation is analytical and empirical.

WEIMER, ARTHUR M., *see* WELLS, HERMAN B., *et al.*

WELLS, HERMAN B., RALPH E. CLELAND, ARTHUR M. WEIMER, WILLIAM L. HAEBERLE, PAUL KLINGE, HOWARD L. TIMMS, NEVIN W. RABER, AND E. W. MARTIN, JR. **Aerospace Research Applications.** Indiana University, Graduate School of Business, Bloomington, Ind. (Papers; started 1963.)

A technical library is being established which will include most of the National Aeronautics and Space Administration reports, information on potential industrial applications of NASA R&D programs, and material from AEC, DOD, and the Department of Commerce. Experiments are being conducted with member companies to devise ways of accelerating the application of new knowledge resulting from NASA programs to industrial and consumer purposes. Methods employed will include the use of information retrieval systems for library materials, direct consultation with company officials, and panels representing science and the academic community.

WORCESTER, DEAN A., JR. Oligopoly and Research. University of Washington, Department of Economics, Seattle, Wash. (Book chapter; started 1959; EDC, 1964.)

The first part of the study consists of a survey of literature and an analysis of data collected by the National Science Foundation to define the issues of interaction between the quantity of research effort and the market structure. The second part relates the effects of independent leadership and collusive behavior to equilibrium and to optimal levels of research effort.

ZUCKERMAN, JOHN V. AND ELLIOT BEIDEMAN. A Model of the Industrial Diversification Process: Employment of Federally Sponsored Technology in Commercial Enterprises. University of Southern California, Graduate School of Business Administration, Department of Business and Industrial Management, Los Angeles, Calif. (Book, dissertation; started 1964; EDC, 1966.)

The study involves participant-observation of the planning, formation, operation, and evaluation of the work of the Industrial Diversification Institute. This community nonprofit corporation in California was formed to aid medium-sized defense subcontractors to diversify by employing federally sponsored technology which has been evaluated, developed, and brought to market. If the model is successful, the dissertation will be a guide for its duplication.

For other projects pertaining to

GENERAL ECONOMIC ANALYSIS

see:

ARRINGTON, LEONARD J. AND GEORGE JENSEN. The Impact of Defense Installations and Defense Manufacturing on the Economy of Utah___ Section 6
BANGS, ROBERT B. AND JOHN F. CREED. Tax Problems Connected With Patents and Related Industrial Property___ Section 11
BARKLEY, PAUL AND PETER E. HILDEBRAND. Appraisal of Opportunities for Adjusting Eastern Colorado Farming to Prospective Markets___ Section 1
BASS, HENRY L. Statistical Study of the Educational Background of Management With Special Reference to Scientists and Engineers___ Section 8
CAPLOW, THEODORE AND KURT FINSTERBUSCH. Patterns of Economic and Social Development in the Modern World___ Section 10
CHAPPELL, JOSEPH S. AND WILLIAM D. TOUSSAINT. An Economic Analysis of the Influences of Various Harvesting and Curing Methods on the Grade-Price Relationships and on Harvesting and Curing Costs of Flue-Cured Tobacco___ Section 1
CHERIAN, EDWARD J. Government Use of Incentive Contracts___ Section 6

COCHRANE, WILLARD W. The City Man's Guide to the Farm Problem .... Section 1

COMANOR, WILLIAM S. Economics of Research and Development in the Pharmaceutical Industry .... Section 7

DEAN, BURTON V. Project Evaluation and Selection .... Section 5

FOGEL, WALTER A. Technological Change and the Work Force in Retail Trade .... Section 7

HAMBERG, DANIEL. Sources of Economic Growth: A Study of the Relation Between Investment, Technological Change, and Economic Growth Section 10

———. Statistical Analysis of R&D Expenditures .... Section 14

HARMS, LOUIS T. AND ROSELLA JAMES. Development of Labor-Force Employment and Unemployment Data for the 67 Counties of Pennsylvania .... Section 12

HARRIS, L. JAMES AND IRVING H. SIEGEL. Positive Competition .... Section 11

HATHAWAY, DALE E. Economic Adjustment of Agriculture to Industrialization Growth and Change in the Nonfarm Economy .... Section 1

HOGLUND, C. RAYMOND. Economic Analysis of Improved Technology in Producing and Harvesting Forage Crops .... Section 1

HORNE, WILLIAM J. Entrepreneurial Aspects of High-Speed Computing .... Section 13

HOYT, ELIZABETH E. General Theory of Culture Change Among Underdeveloped Peoples Under the Impact of Modern Technology .... Section 9

KRAMER, HELEN M. Economic Impact of the Aircraft, Missiles, and Electronics Industries in the United States, 1950–61 .... Section 7

LOVEJOY, FREDERICK A. Research and Development Project Abandonment Decisions .... Section 14

MACHLUP, FRITZ and colloborators. Economic Aspects of Patent Protection, Technological Inventions, and Their Development .... Section 11

MAHAR, JAMES F. AND LLOYD G. MARTS. Impact of Automation on Employment in the Power Laundry Industry—Preliminary Analysis .... Section 7

MAKI, WILBUR R. Effects of Agricultural Adjustment on the Growth of Farm-Related Business .... Section 1

MOYER, REED. Competition in the Midwestern Coal Industry .... Section 7

MURRY, DONALD. Scientific Research in Missouri .... Section 10

NEEDHAM, DOUGLAS. The Effect of the Patent Incentive on Innovative and Inventive Activity .... Section 11

PARTENHEIMER, E. J. AND P. L. STRICKLAND, JR. An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region To Meet Changing Conditions—Revised .... Section 1

PEACH, W. N., *et al.* Economic Study on 564 Counties of the States of Arkansas, Iowa, Kansas, Missouri, Nebraska, and Oklahoma .... Section 13

PLAXICO, JAMES S., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Oklahoma To Meet Changing Conditions .... Section 1

PRICE, DEREK J. DE SOLLA. Historical and Statistical Studies of Science, Technology, and Medicine .... Section 3

PUFFER, FRANK. The Impact of Defense Expenditures on the San Diego Area .... Section 6

ROBERTS, EDWARD B. Technology Utilization: Role of New Enterprises "Spun Off" from Government-Sponsored R&D Organizations .... Section 6

ROSSE, JAMES N. Impact of Technological Change and Economies of Scale on the Structure of the American Daily Newspaper Industry .... Section 7

RUDD, ROBERT W., *et al.* Development Patterns in Kentucky Agriculture .... Section 1

SANDERS, BARKEV S. Sources, Uses, and Values of Patented Inventions .... Section 11

SCHMOOKLER, JACOB. Determinants of Inventive Activity .... Section 11

Seltzer, George. Manpower Assessment of the Iron Ore Industry — Section 12

Siegel, Irving H. Analysis of Published Company Information on Research and Industrial Property — Section 11

Siegel, Irving H. and collaborators. Role of Patents in the Creation, Development, and Operations of Small Industrial Firms — Section 11

Strassman, W. Paul. Factor Proportions, Technological Change, and Industrialization in Underdeveloped Countries — Section 10

Weidenbaum, Murray L. and collaborators. Economic Implications of the National Space Program — Section 6

Wiegmann, Fred H., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions — Section 1

Williams, Willard F. Economic Effects of Technological and Organizational Changes in Cattle Feeding and Meat Packing — Section 1

Wirthlin, Richard B. The Influence of International Trade on Technological Change in the Economically Underdeveloped Nation — Section 10

Young, James E. Development of Methodology for the Study of Employment Effects of Automation in Selected Arizona Industries — Section 12

SECTION 3

History and Philosophy of Science and Technology

BECKER, JAMES F. **Classical Economic Philosophy of Science.** New York University, School of Commerce, Department of Economics, New York, N.Y. (Articles; started 1960.)

The project reconstructs and revaluates the philosophy of science which dominated the classical English school of economics. It will cover the classical period, from Adam Smith through Karl Marx.

BERMAN, ALEX. **Science and French Pharmacy: 1800-1873.** University of Texas, School of Pharmacy, Austin, Tex. (Book; started 1962; EDC, 1965.)

The study will focus on the direction and character of the period from 1800 to 1873 and will explore the interrelations of cross-fertilization of ideas in pharmacy and in science and medicine. A number of representative case studies in depth will be undertaken to illustrate further the scientific contributions of pharmacists during this period.

COHEN, ROBERT S. and collaborators. **Studies in the Relation of the History of Science and the Philosophy of Science.** Boston University, Department of Physics, Boston, Mass. (Book, articles; started 1954; EDC, 1966.)

This project is concerned with comparative and historical studies in the philosophy of science. The importance of the sociology of knowledge for the philosophy of science and an analysis of alternative interpretations of the history of science are included. Writers being studied include Zilsel, Meyerson, and Needham. Other subjects will include Marxist interpretations of science and the role of mystical attitudes in the stimulation of science.

DEBUS, ALLEN G. **The "Chemical Philosophers" and the Scientific Renaissance.** University of Chicago, Department of History, Chicago, Ill. (Paper; started 1964; EDC, 1965.)

The purpose of this paper is to provide an understanding of the rise of modern science in the 16th and 17th centuries by investigating the work of "chemical philosophers" whose efforts were taken seriously by the more modern scientists of that era. The present project will form part of a broader study of the relation of the Paracelsian concepts to the Scientific Revolution as a whole.

DEBUS, ALLEN G. Elias Ashmole, Theatrum Chemicum Britannicum (London, 1652). University of Chicago, Department of History, Chicago, Ill. (Book chapter; started 1964; EDC, 1965.)

This study involves preparation of the introduction to a reprint of *Theatrum Chemicum Britannicum*, the only large collection of alchemical tracts ever to appear in English, to point out its importance as a source of early scientific concepts. The original collection presents a broad spectrum of medieval and early modern science in works dating from the 14th to the 17th centuries. For the most part they represent the traditional allegorical approach to the nature of the alchemist but contain some evidence of newer scientific trends.

DRISCOLL, GLEN R. Lessons From the Past: What the Modern World Can Learn From the History of Science. University of Missouri, Department of History, St. Louis, Mo. (Book; started 1961; EDC, 1964.)

Some intellectual maxims which can be illustrated with examples from the history of science are the subject matter of this study. These maxims have been selected for their validity in almost any field of scholarship, and each of them will be illustrated with examples of scientists and their work from the past.

DUPREE, A. HUNTER. Studies in the History of Science in the Federal Government, 1940-60. University of California, Department of History, Berkeley, Calif. (Books, articles; started 1961; EDC, 1965.)

This is a study of the relation of the Federal Government to the total scientific research establishment of the Nation based on primary (both documentary and oral) historical sources. Emphasis will be on the agencies most closely concerned with research and the formulation of policy on research.

GASMAN, DANIEL. Ernst Haeckel and the Acceptance of Darwinism in Germany. University of Chicago, Department of History, Chicago, Ill. (Dissertation; started 1962; EDC, 1965.)

This study analyzes the scientific and philosophical ideas of Ernst Haeckel and their social implications. Particular emphasis is placed on the development of Social Darwinism in Germany.

HACKER, BARTON C. The Relationship of Science to the War Machines of Antiquity. University of Chicago, Department of History, Chicago, Ill. (Article.)

The article will survey primary and secondary sources on the history and mechanical characteristics of ancient catapults. Interrelationships will be explored among science and technology in antiquity, the role of prior scientific theory in catapult development, social and political factors in catapult development, and the military and political significance of catapults.

HAYS, JO N. Methods of Scientific Popularization in Early Nineteenth Century Britain. University of Chicago, Department of History, Chicago, Ill. (Dissertation; started 1964; EDC, 1965.)

This is a study of the activities of three societies in pre-Darwinian England (the Society for the Diffusion of Useful Knowledge, the London Institution, and the Royal Institution) in popularizing science among a variety of social classes. The study will include examination of: (*1*) beliefs, scientific and otherwise, of the men involved; (*2*) organizational structure in which this popular science operated; (*3*) position of "popular scientists" (if such a distinction proves valid) within the scientific community and the community at large; (*4*) audiences and support for popular science of the societies; and (*5*) possible links, comparisons, and contrasts in approach and membership of the three societies in question.

HILL, BOYD H., JR. Impact of Medical Ideas on Medieval Thought. University of Colorado, Department of History, Boulder, Colo. (Book; started 1962; EDC, 1965.)

The purpose of this book is to show how specific medical ideas during the Middle Ages influenced theologians and philosophers. Key questions are: How much did various physiological and anatomical doctrines of the Middle Ages influence theologians studying the nature of the soul, and how did physiological and anatomical ideas influence economic, legal, and social theories?

HIRSCH, WALTER. Science Under the Nazis. Purdue University, Department of Sociology, Lafayette, Ind. (Book, papers; started 1964; EDC, 1966.)

The study will analyze political and ideological pressures on the conduct of scientific research during the Nazi regime and ways in which the scientific establishment attempted to maintain its autonomy. Data will be drawn from documentary sources and interviews.

KRANZBERG, MELVIN. Economic Prerequisites of Technological Acceleration. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Article; started 1964; EDC, 1965.)

This historical study examines the economic prerequisites of industrialization based upon a case study of the Industrial Revolution in the later 18th and 19th centuries.

———. Industrial Revolutions. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Book, articles; started 1959; EDC, 1966.)

This is a study of industrial revolutions throughout history with special emphasis on the causal factors, nature of industrial change, and economic and sociocultural implications of technological change. The study concentrates on technological bases; the approach is historical, with special attention on the "new" industrial revolution.

KRANZBERG, MELVIN. **Inventions and Discoveries.** Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Article; started 1964; EDC, 1965.)

The article will consist of a brief historical summary of the factors involved in inventions and discoveries and a discussion of the various interpretations which have been advanced to account for such developments.

———. **Technology and Human Values.** Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Article; started 1964; EDC, 1964.)

This is a historical analysis of the basic values of Western civilization and how technology has aided their achievement. The study will include a defense of technology against its "humanist" detractors.

———. **Technology and the Idea of Mankind.** Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Paper; started 1964; EDC, 1964.)

The paper takes a historical approach to the ways in which technological developments have affected the concepts and practices of human brotherhood.

KRANZBERG, MELVIN AND CARROLL W. PURSELL, JR. **A History of Technology.** Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Book; started 1964; EDC, 1966.)

The project will be a two-volume work on the history of technology with emphasis on the sociocultural parameters of technological development. Volume I carries the story from the earliest times to the end of the 19th century; Volume II deals with 20th century developments. The completed work will contain 90 chapters written by some 60 scholars.

KWOK, DANIEL WYNN-YE. **Scientism in Chinese Thought, 1900-1950.** University of Hawaii, Department of History, Honolulu, Hawaii. (Book; started 1958; EDC, 1964.)

This study deals with the impact of science on Chinese thought during China's modern transformation. The study investigates leading thinkers, mostly non-scientists, and the numerous intellectual debates of the years covered.

LANE, FREDERIC C. **Effects of Changes in Nautical and Military Technology on the Status of Seamen, 1200-1700.** Johns Hopkins University, Faculty of Philosophy, Department of History, Baltimore, Md. (Started 1959; EDC, 1966.)

This study will undertake an analysis of account books, court records, laws, and accounts of travelers to estimate the effects of changes in technology on seamen.

MERTON, ROBERT K. Behavior of Scientists: Studies in the Sociology of Science. Columbia University, Graduate Faculty of Political Science, Department of Sociology, New York, N.Y. (Book, articles.)

Continuing studies are based on interviews with scientists and on life-history documents (diaries, letters, autobiographies) and other documents in the history of science. Prime emphasis is on multiple independent discoveries which are analyzed statistically as well as qualitatively.

MOORE, J. PRESTON. Antonio de Ulloa: Scientist and Colonial Administrator. Louisiana State University and Agricultural and Mechanical College, Department of History, Baton Rouge, La. (Book; started 1960; EDC, 1966.)

This work will be a documented account of the personal life, career, and scientific and cultural contributions of an important Spanish figure of the Age of Enlightenment. De Ulloa was one of the two Spanish members of an expedition to measure an arc of the meridian at the equator, and he wrote the first account of the mission to be published in Europe. He also is thought to be the discoverer of platinum.

PRICE, DEREK J. DE SOLLA. Historical and Statistical Studies of Science, Technology, and Medicine. Yale University, Department of History of Science and Medicine, New Haven, Conn. (Books, articles; started 1960.)

This continuing project covers the entire spectrum of the history of science from ancient to modern times and will include pure and applied sciences, history from within and from outside the sciences, studies of philosophy of science, sociology and psychology of scientists, the political and social effects of science, and the planning and administration of scientific policy at all levels. Special work is being done in the area of theoretical and statistical investigations of scientific literature and manpower in their historical perspectives and in relation to present problems in these areas.

PURSELL, CARROLL W., JR., *see* **KRANZBERG AND PURSELL.**

RICE, PHILIP M. History of Engineers in the United States. Claremont Graduate School and University Center, Claremont, Calif. (Book; started 1953; EDC, 1964.)

Volume I is a study of military and civil engineering to 1877, including: (*1*) impact of engineers on State and national financing, (*2*) national versus sectional attitudes, and (*3*) comparison of American engineers abroad and foreign engineers in the United States. Volume II covers engineering since 1877, centering on the technical impact of engineering on American society.

SCHILLING, WARNER R. Admirals and Foreign Policy. Columbia University, Department of Government, New York, N.Y. (Book; started 1953; EDC, 1964.)

This is a study of the relationship of naval technology and doctrine to foreign policy during the Wilson administration. Archival data furnished most of the reference material.

SHARLIN, HAROLD I. History of Science in the Nineteenth Century. Iowa State University of Science and Technology, Department of History, Government, and Philosophy, Ames, Iowa. (Book; started 1962; EDC, 1965.)

The work will contain a history of the similarities in the development of chemistry and physics and the mutual interdependence of these sciences.

SKOLIMOWSKI, HENRYK. The Language and Structure of Technology. University of Southern California, School of Philosophy, Los Angeles, Calif. (Book; started 1961; EDC, 1966.)

The study will inquire into the specific characteristics and methods of the engineering sciences to determine and describe their place in the general classification of science and, in particular, to demonstrate that they are not derived from or dependent upon the natural sciences. The discovery of structures of thinking peculiar to the engineering sciences will facilitate their further progress and make the teaching of engineering more efficient.

SPENGLER, JOSEPH J. History of Economic Ideas in Asia, the Middle East, and Europe Before 1700. Duke University, Department of Economics, Durham, N.C. (Book, articles; started 1957; EDC, 1965.)

Part of the research inquires into the reasons science did not advance more in an economically oriented sense as well as contribute more to economic growth.

STEPHENSON, MATTHEW A. Theories of Technological Change in the English Classical School. Tulane University of Louisiana, Department of Economics, New Orleans, La. (Dissertation; started 1962; EDC, 1965.)

This study analyzes the extent to which leading economists from 1776 to 1848 were able to incorporate into their development models the technological changes taking place in agriculture and industry.

SÜSSKIND, CHARLES. History of Electronics. University of California, School of Engineering, Department of Electrical Engineering, Berkeley, Calif. (Books, papers; started 1960.)

This is a continuing study of original sources and historical accounts in electronics with a view to determining the influences on society and culture of advances in the field since 1900.

WHITE, LYNN T., JR. Elements of Indic Science and Technology in the Western Middle Ages. University of California, Department of History, Los Angeles, Calif. (Articles; started 1961; EDC, 1966.)

This project will endeavor to identify, trace, and date the arrival of items of Indic science and technology as they evolved in the West between Cosmas Indicopleustes and Vasco da Gama. Documentary, archeological, iconographic, and etymological materials will be used.

For other projects pertaining to

HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY

see:

BASALLA, GEORGE. Science and Government in England: 1660–1918 Section 4
BECKER, JAMES F. The Classical (Economic) Philosophy of Science Section 2
BENNETT, JOHN W. Habitat, Institutions, and Economic Development in Saskatchewan: Studies in the Cultural Ecology of the Great Plains Section 4
COWAN, DONALD R. G. Growth Requirements of the Steel Industry Section 7
GLASSON, JOHN E. Federal Policy Organization for Science, 1957–62: The Congressional Position and Role Section 6
GROSS, ANDREW C. Technological Change, Manpower Utilization, and Educational Qualifications: Some Preliminary Investigations in a Canadian Setting Section 4
HARDIN, EINAR. Economic and Social Implications of Automation: Volume III, Abstracts of Social Science Literature, 1961–64 Section 12
HEALD, MORRELL. Mass Production and Managerial Ideologies, or the Social Relations of Business Management Section 2
HIGHAM, ROBIN. A History of British Air Power Section 4
———. Production and Politics: A Study of the British Aircraft Industry Section 4
HURT, ROBERT M. An Intellectual History of the American Patent System, With Special Consideration for the Ideas of Property Rights Section 11
LYONS, GENE M. Science and Politics Section 6
MEEHAN, EUGENE J. Science and Social Values Section 9
NIEBURG, H. L. Technology and Diplomacy Section 6

PENICK, JAMES L., JR., *et al.* **Readings in Science and Public Policy, 1940–60** .... Section 6

PERRY, STEWART E. **Science, Psychiatry, and the American Society: A Study in the Social Integration and Insulation of Scientific Ideas** .... Section 9

PHILLIPS, BERNARD S. **Strategy and Tactics of Social Research** .... Section 9

PURCELL, CARROLL W., JR. **Science and Government in the Great Depression, 1929–39** .... Section 6

ROCK, VINCENT P., *et al.* **Program of Policy Studies in Science and Technology** .... Section 6

SCHILLING, WARNER R. **The H-Bomb Decision** .... Section 6

SCHLEBECKER, JOHN T. **Scientific and Technical Development of American Agriculture** .... Section 1

SINGER, J. DAVID. **Weapons Technology and Its Impact on the Frequency and Magnitude of International War** .... Section 6

STOCKING, GEORGE W., JR. **Race and Culture in American Social Science** .... Section 9

STORER, NORMAN W. **Continuing Theoretical Analysis of the Social System of Science** .... Section 9

SWAIN, DONALD C. **Federal Government and Natural Resources, 1933–60** .... Section 6

THORSON, THOMAS L. AND COLLABORATORS. **Science and Culture Change** .... Section 8

SECTION 4

International and Foreign Studies

ANDREWS, P. W., *see* **GOLD, BELA,** *et al.*

ASHFORD, DOUGLAS E. National Development and Local Reform. Cornell University, Graduate School of Business and Public Administration, Ithaca, N.Y. (Book, articles; started 1962; EDC, 1965.)

This analysis compares the ability of several types of political systems to bring technological and developmental requirements to bear on local populations. The study seeks to assess the versatility and effectiveness of the Moroccan monarchy, the Tunisian single party, and the Pakistan military regime in the use of governmental and administrative devices to give citizens competence in a specific field and to create communication between citizens and governments arising from achievements in technological and developmental reform. The thesis explored is that political systems in developing countries may vary widely in the capacity to absorb the impact of science and technology at the local level according to the adaptiveness of the political system itself and its ability to integrate more confident, articulate citizens.

BASALLA, GEORGE. Science and Government in England: 1660-1918. University of Texas, Department of History, Austin, Tex. (Book, articles; started 1963; EDC, 1965.)

This is a study of the relationship between science and government in England from the founding of the Royal Society to World War I. Emphasis is placed on influence of maritime affairs, industrialization, rise of professional scientists, and military needs. Government documents will provide major primary sources of material.

BASIUK, VICTOR. Technological Change and the Balance of Power. Columbia University, Institute of War and Peace Studies, New York, N.Y. (Book; started 1961; EDC, 1965.)

The project analyzes the impact of technological innovations on the changes in power positions of the Great Powers between 1870 and the present. Among the areas of technology covered are steel, electricity, chemistry, nonferrous metals, communications, transportation, weapons, and atomic energy. The study attempts to establish trends for the future and their implications for American foreign policy. The method of investigation consists primarily of analysis of published and unpublished materials and interviews.

Bennett, John W. **Habitat, Institutions, and Economic Development in Saskatchewan: Studies in the Cultural Ecology of the Great Plains.** Washington University, Department of Sociology and Anthropology, St. Louis, Mo. (Book, monograph, papers; started 1961; EDC, 1964.)

This study investigates the interrelations of habitat, technology, and society in the semiarid grassland area of the Canadian Plains. It will examine the ways government has introduced rationalized adaptations to the natural environment and the effects of such adaptive mechanisms on the culture and society of the agricultural and ranching populations. It will also make historical studies of changing modes of adaptation to the environment, from Amerind bison hunters through the 60 years of white settlement.

Bennis, W. G., *see* **Savage and Bennis.**

Bernstein, Herbert M. **Analysis of the Postwar Growth of the Japanese Photographic Industry.** Western Reserve University, Department of Economics, Cleveland, Ohio. (Dissertation; started 1962; EDC, 1965.)

The purpose of the study is to ascertain why investment went into this particular Japanese industry at the end of World War II when the industry appeared to be nonessential. It emphasizes the effects of World Wars I and II; the Korean war; the domestic, American, and European markets; and industrial characteristics, innovations, and technological advantages of the Japanese. Most of the information has been acquired from trade journals, financial reports and analyses, and government periodicals.

Brunner, Elizabeth, *see* **Gold, Bela,** *et al.*

Cappannari, Stephen C., *see* **Moss and Cappannari.**

Cheng, Tien-Hsi. **A Critical Review of Developments in Biological Sciences in Mainland China.** The Pennsylvania State University, College of Science, Department of Zoology, University Park, Pa. (Book, article; started 1960.)

This study investigates published information in each biological science area and will include: (*1*) background, organization, and personnel; (*2*) major research programs and findings; (*3*) present status and future outlook; (*4*) evaluation of reported achievements with respect to contributions to scientific knowledge; and (*5*) impact of each biological science area of development on China's socioeconomic conditions.

Chihote, Ronald H. **The Spanish Iron and Steel Industry: The Role of Heavy Industry in a Developing Nation.** University of California, Department of Political Science, Riverside, Calif. (Book; started 1960; EDC, 1964.)

This is a historical and geopolitical analysis of the iron and steel industry and an evaluation of heavy industry's role in Spain's development and modernization. An appendix to the book will consider the impact of technology on the iron and steel industry in other developing nations.

DeWitt, Nicholas. **Research and Development in the U.S.S.R.** Indiana University, Department of Economics and Government, Bloomington, Ind. (Book; started 1959.)

This research deals with the institutions, organization, and management of Soviet research and development. Emphasis is on institutions of the Academy of Sciences and on industrial research organizations. The current reorganization of the management of research in the U.S.S.R. will also be highlighted. Interrelations of Soviet research efforts with scientific research in COMECON countries will be discussed.

Estep, Samuel D. **Doing Nuclear Business Across International Lines.** The University of Michigan, School of Law, Ann Arbor, Mich. (Book; started 1961; EDC, 1965.)

The project will analyze the legal, economic, and political problems created by development of industrial uses of nuclear energy and its exchange across international lines, particularly between the United States and Europe. The principal research techniques are personal interviews with business leaders, government administrators, and the lawyers of both groups, as well as legal analysis of various statutes and administrative regulations.

Field, Mark G. **Social Environment of the Soviet Scientist.** Boston University, Department of Sociology and Anthropology, Boston, Mass. (Monograph; started 1961; EDC, 1964.)

The study attempts to examine the social context of science in the Soviet Union, including such areas as recruitment, training, distribution of scientists, organization of scientific work, and interference of financial authorities with scientific activities. It is based primarily on an examination of Soviet sources.

Fox, Renée C. **American Sociologist in the Land of Belgium Medical Research.** Columbia University, Barnard College, Department of Sociology, New York, N.Y. (Book, EDC, 1964.)

The study analyzes the effects of social, cultural, and historical factors on medical research in Belgium and the response of various sectors of Belgian society to a published analysis by the American sociologist. A combination of these factors will offer insights into certain general characteristics of Belgian society.

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FOX, RENÉE C. Study of Congolese Graduate Physicians. Columbia University, Barnard College, Department of Sociology, New York, N.Y. (Paper, article; started 1963; EDC, 1964.)

This is a study of the first Congolese graduate physicians who have recently returned to the Congo after medical study in Europe. It will compare these graduates who were medical assistants before they left the Congo with Congolese medical assistants who were not sent abroad to become fully trained physicians. The method of investigation consists mainly of focused interviews.

GIBBONS, WILLIAM J., S.J. Scientific and Technical Manpower: Inventory of World Resources. Fordham University, Department of Economics, New York, N.Y. (Report; started 1963; EDC, 1966.)

This report will be divided into two parts. Part one will focus on the scientific and engineering manpower resources for each member country of the United Nations and some nonmember countries. Data will include the current total inventory of scientists and engineers, numbers of enrollments and graduations, and breakdowns by individual scientific and engineering disciplines. Part two will consist of an evaluation of broad worldwide trends and developments in the training of scientists and engineers and will correlate inventory data with demographic factors of total population, size of labor force, size of professionally trained personnel, etc.

GLADE, WILLIAM P., JR. The Latin American Economies: A Study of Their Institutional Evolution. University of Wisconsin, School of Commerce, Madison, Wis. (Book; started 1958; EDC, 1965.)

The project will study the impacts of technological developments and accompanying economic changes on social organization in Latin America. The conditioning influence exerted by social organization on the capacity of Latin America to receive technological and economic innovations will also be considered. This interdisciplinary project draws on research in history, political science, cultural anthropology, and social psychology as related to economic analysis.

GOLD, BELA, P. W. ANDREWS, AND ELIZABETH BRUNNER. Major Technological Change: A Case Study in the British Steel Industry. University of Pittsburgh, Graduate School of Business, Department of Industrial Economics, Pittsburgh, Pa. (Gold), and Nuffield College, Oxford University, England (Andrews and Brunner). (Book; started 1964; EDC, 1965.)

This is a detailed analysis of a major technological innovation in a large British steel company, from initial consideration and planning through actual introduction and operation. It explores the relevance of current theories concerning the nature, management, and effects of such innovations.

GROSS, ANDREW C. **Technological Change, Manpower Utilization, and Educational Qualifications: Some Preliminary Investigations in a Canadian Setting.** The Ohio State University, Department of Economics, Columbus, Ohio. (Dissertation; started 1964; EDC, 1966.)

The first part of the study will be historical-theoretical and will deal with science and technology in general, advances in electrical engineering in particular, and with institutional factors of Canada. The second part will be an empirical investigation of three firms in electric utility, electrical manufacturing, and electronics. Three graduating classes (1954, 1959, 1964) of electrical engineers from Canadian universities will also be studied.

HATHAWAY, DALE E. **Food, Economic Development, and International Relations.** Michigan State University of Agriculture and Applied Science, Department of Agricultural Economics, East Lansing, Mich. (Papers, articles; started 1964; EDC, 1965.)

This is primarily a study of the long-run economic and political implications of the current and prospective increase in agricultural output of advanced countries. The investigation has included a 5-month tour to discuss these implications with top policymakers in Western European countries. In addition, econometric models of agricultural sectors of the wealthy countries are being constructed in an attempt to predict probable output of farm products under different rates of technical change and to predict the probable levels of surplus disposal operation that might be available to help poor countries under these various assumptions.

HIGHAM, ROBIN. **A History of British Air Power.** Kansas State University of Agriculture and Applied Science, Department of History, Manhattan, Kans. (Book; started 1964; EDC, 1966.)

The effects of the interrelation of the military air forces and civilian airlines on the aircraft industry will be studied. The method of investigation is historical and statistical, using published and unpublished materials.

———. **Production and Politics: A Study of the British Aircraft Industry.** Kansas State University of Agriculture and Applied Science, Department of History, Manhattan, Kans. (Book, articles; started 1961; EDC, 1967.)

This is a study of the British aircraft industry from the inception of the Advisory Committee for Aeronautics in 1909 to the present. The project will include interrelations of political, economic, and military factors regulating design and development of civil and military aircraft, with graphs illustrating time and capacity factors.

HILL, ROBERT E. **Mechanized and Automated Society: A Paradigm.** Kent State University, College of Business Administration, Department of Economics, Kent, Ohio. (Monograph; started 1964; EDC, 1964.)

The objective of the study is to describe the forces of mechanization and automation that are in an advanced or mature stage in the United States and are evident in certain other nations (Denmark, England, Japan, West Germany, Canada, and Argentina.) The second part of the study will isolate certain leading American overtones for a "model society" that emerge as this society's mechanization-automation processes mature and are reflected in the way of life of the nation. The method uses empirical investigation of representative industries and existing literature.

KARSH, BERNARD AND SOLOMON B. LEVINE. **Long-Run Impact of Technological and Organizational Changes on the Nature of Industrial Relations and Structure and Function of the Labor Movement in Japan.** University of Illinois, Institute of Labor and Industrial Relations, Urbana, Ill. (Articles; started 1959; EDC, 1968.)

This project concerns the impact of rapid technological change on institutions comprising the Japanese industrial relations system and comparisons of the results with similar developments in the United States and Western Europe.

KIT, BORIS. **Current Inventory, Development, and Future Planning for Scientific and Technical Manpower Resources in the Field of Space Sciences and Technology in the U.S.S.R.: A Pilot Project.** University of Maryland, Department of Physics and Astronomy, College Park, Md. (Report; started 1962; EDC, 1964.)

The study analyzes scientific and engineering manpower resources in the Soviet Union in the fields of space sciences and technology. Particular emphasis involves the development of needed scientific and technical manpower resources against the background of known or planned programs of space explorations as reported in official Soviet source materials. The study will also give attention to the differentiation of sciences; the intensive development of branches such as biophysics, astrophysics, and radioastronomy; and the impacts in higher educational institutions.

LEVINE, SOLOMON B., *see* **KARSH AND LEVINE.**

MOSS, LEONARD W. AND STEPHEN C. CAPPANNARI. **Village Organization in South Italy.** Wayne State University, Department of Sociology and Anthropology, Detroit, Mich. (Moss), and Vanderbilt University, School of Medicine, Nashville, Tenn. (Cappannari). (Monograph, articles; started 1955; EDC, 1965.)

Emphasis in this comparative anthropological study of village organization in South Italy will be placed on family, economic orientation, and impacts of technological change on social organization.

Nehnevajsa, Jiri, Stanley E. Shively, and Michael D. Walton. Anticipations of Cold War Futures. University of Pittsburgh, Department of Sociology, Pittsburgh, Pa. (Book; started 1962; EDC, 1964.)

The project samples the opinions of legislators and students in Brazil and Finland (1960 and 1961), France, India, Japan, and Spain (1961 and 1962), and Germany (1961) on the probabilities and desirabilities of 35 alternative Cold War situations for 1965 and 1966. The method of investigation has included repeated interviews with the same parliamentarians in order to evaluate analytically the impact of intervening events on anticipations. Several smaller studies have been conducted to strengthen the anticipations theory upon which the larger studies are based.

Phillips, Walter. Educational Systems and the Supply of Scientists and Engineers in Four Countries. University of Illinois, Institute of Labor and Industrial Relations, Urbana, Ill. (Dissertation; started 1960; EDC, 1965.)

This is a comparative (cross-national) study of the structure and functions of the higher educational systems of France, England, Germany, and the United States, with some reference to the Soviet Union. The focus of the study is on the accommodation of new disciplines and fields in science and technology. The frame of reference is sociological and institutional and will use historical descriptions and official statistics.

Polson, Robert A. Technological Change in the Rural Philippines. Cornell University, New York State College of Agriculture, Department of Rural Sociology, Ithaca, N.Y. (Monographs, articles; started 1951.)

This long-term study, conducted in cooperation with Agaton P. Pal of Silliman University, Dumaguete City, Philippines, is projected for a 25-year period. The baseline survey was made in December 1952, with a resurvey in 1958 and another projected for 1967. Field interviews are conducted with 600 heads of rural households regarding the rates of acceptance and factors influencing the acceptance of selected agricultural, health, and educational practices. Additional studies of the same sample of households are also planned. A monograph has been prepared on the 1952 and 1958 data.

Pundeff, Marin V. Science and Engineering Manpower Resources in Eastern Europe. San Fernando Valley State College, Department of History, Northridge, Calif. (Book; started 1964; EDC, 1965.)

This study will investigate the supply, demand, utilization, employment, and education of scientific and engineering manpower at the level of higher professional education and, where possible, at the technician level of training in the eight East European Communist countries. It will attempt to delineate the import of Soviet influence in the areas of education, science organization, and economic control. The correlation between economic development and factors of education, planning, and centralized economic control will also be analyzed.

QUINN, JAMES B. **National Planning of Science and Technology in Europe.** Dartmouth College, Amos Tuck School of Business Administration, Hanover, N.H. (Articles, book chapters; started 1963; EDC, 1966.)

The project will develop information on major contributions and problems involved in national planning of science and technology within the context of a free enterprise system by means of a search of the literature and by interviewing 170 top scientific and management people in industry, government, institutes, and universities in Europe. It will analyze the specific mechanisms found useful in individual countries for developing and allocating scientific and technical resources and for obtaining maximum yield from these resources in the civil sector of the economy. An attempt will also be made to develop the conceptual structure for rational science and technological policy formulation in a free society.

SAVAGE, CHARLES H., JR., AND W. G. BENNIS. **Human and Organizational Consequences of Two Computer Installations in South America.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Book, articles; started 1963; EDC, 1965.)

This research concerns the installation of two high-speed computers in Colombia. The issues being studied are: (*1*) how a traditional culture adapts to and modifies technological devices, (*2*) how the human organizations affected by the computer react to it, and (*3*) in what ways decision-making will be changed by the acceptance of the computers.

SHIVELY, STANLEY E., *see* **NEHNEVAJSA, JIRI,** *et al.*

SKOLNIKOFF, EUGENE B. **Science and Technology in Policy-Making for Foreign Affairs.** Massachusetts Institute of Technology, Department of Economics and Social Science, Cambridge, Mass. (Book; started 1963; EDC, 1965.)

This project will analyze scientific and technological components of foreign policy issues with implications for the making of policy and will examine government organization in the light of foreign policy needs and opportunities.

SOMMERS, LAWRENCE M. **Regional Impact of Technological Developments Upon the Farming-Fishing Economy of Northern Norway.** Michigan State University of Agriculture and Applied Science, School of Social Science, Department of Geography, East Lansing, Mich. (Paper; started 1962; EDC, 1964.)

The study analyzes regional changes taking place in the heavily subsidized farming and fishing industries of northern Norway which have resulted from technological change as well as market competition within the European Federal Trade Association and the European Economic Community.

Walton, Michael D., *see* **Nehnevajsa, Jiri**, *et al.*

Wekerle, Anton. Evaluation of the Role of the Sino-Soviet Bloc Countries in the Development of Scientific and Engineering Manpower Resources of Other Countries. The American University, School of International Service, Washington, D.C. (Report; started 1961; EDC, 1965.)

The report will analyze concrete measures and policy decisions being taken by countries within the Sino-Soviet Bloc to develop scientific and engineering manpower resources, including science and engineering teachers and technicians.

For other projects pertaining to

INTERNATIONAL AND FOREIGN STUDIES

see:

Alker, Hayword R., Jr., and Ronald Brunner. Relations Among Scientific, Political, and Economic Development ---- Section 2

Arrow, Kenneth J. and Hollis B. Chenery. Technology and Resource Allocation ---- Section 2

Baranson, Jack. Diesel Engine Manufacturing in Less Developed Countries ---- Section 10

Benoit, Emile. International Economic Adjustments to Disarmament and Arms Control ---- Section 10

———. Relation of the International Economy to Disarmament and Arms Control ---- Section 6

Caplow, Theodore and Kurt Finsterbusch. Patterns of Economic and Social Development in the Modern World ---- Section 10

Cottrell, W Frederick. Impact of Technological Change on Railway Workers in the United States, Britain, and New Zealand ---- Section 7

DeWitt, Nicholas and collaborators. International Survey of Educational Development and Planning ---- Section 10

Esman, Milton J. and Hans C. Blaise. Inter-University Research Program in Institution Building ---- Section 10

Federico, P. J. Foreign Patent Statistics ---- Section 11

Hardin, Einar. Postwar Changes in Productivity and Their Correlates ---- Section 2

Harris, L. James and Irving H. Siegel. Role of Industrial and Intellectual Property in Latin America ---- Section 11

Jacobs, Norman G. Underdevelopment Reconsidered: An Institutional-Sociological Case Study of Iran ---- Section 10

Kash, Don E. International Cooperation in Space: The American Experience ---- Section 6

Lang, Gottfried O., *et al.* Social and Cultural Change in Sukumaland, Tanganika ---- Section 9

Machlup, Fritz and collaborators. Economic Aspects of Patent Protection, Technological Inventions, and Their Development .... Section 11

Nieburg, H. L. Technology and Diplomacy .... Section 6

Quinn, James B. Planning and Control of Science and Technology Section 5

Rogers, Everett M., *et al.* Accelerating the Adoption of Agricultural Innovations .... Section 10

Rossman, Joseph. Nature and Role of Invention and Inventors in Contemporary Society .... Section 11

Rubenstein, Albert H. and Earl C. Young. Organization of Applied Research in Smaller and Developing Countries .... Section 10

Sanders, Barkev S. Sources, Uses, and Values of Patented Inventions .... Section 11

Strassman, W. Paul. Factor Proportions, Technological Change, and Industrialization in Underdeveloped Countries .... Section 10

Trudeau, John, *et al.* Culture Change Among the Creeg Indians of Winisk, Ontario, Canada .... Section 9

Tybout, Richard A. Economics of Research and Development .... Section 2

Weiser, Gerard J. Role of Industrial and Intellectual Property in the European Economic Community .... Section 11

Welles, John G. and Charles H. Prien. Oil Shale: Economic Implications of a New Industry .... Section 7

Wilson, C. Carl, *et. al.* Metalworking Research in United States, Japanese, and European Universities and Institutes .... Section 7

Wirthlin, Richard B. The Influence of International Trade on Technological Change in the Economically Underdeveloped Nation .... Section 10

SECTION 5

Administration, Organization, and Management

ALLEN, THOMAS J., JR., AND DONALD G. MARQUIS. **Information Requirements for Research and Development.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass.

This study will examine parallel Government contracts to compare information sources employed by two or more research and development organizations operating on the same problem. Data are being gathered on various sources of ideas, and proposed solutions to problems are being related to the information sources. Factors affecting availability or proper use of information sources are being determined.

ALLEN, THOMAS J., *see* MARQUIS AND ALLEN.

ANDERSON, ODIN W., *see* GORDON, GERALD, *et al.*

BERTHOFF, WILLIAM E., II. **Mineral Resource Socioeconomics.** New Mexico Institute of Mining and Technology, Bureau of Mines and Mineral Resources, Socorro, N. Mex. (Book, papers, articles; started 1958.)

This continuing project analyzes the policy concept: "the duty to manage natural resources efficiently." The context of the study is technological change in connection with natural resources, commerce, and administrative problems.

Historical, deductive, and comparative methodologies are used to develop a theoretical polity and policy basis for resource administration. Data collection and analysis for specific problems will be developed as a second phase. The book contents will be: Part I, Elements of Commercial Organization; Part II, Elements of Jurisprudence; Part III, Elements of Management and Group Behavior; and Part IV, Elements of Valuation.

BURACK, ELMER H., *see* MCNICHOLS AND BURACK.

CHASTAIN, CLARK E., MARVIN G. DEVRIES, AND HARRY C. VAN MATRE. Financing New Research and Development Oriented Enterprises as Compared With New Formations and Expansion of Other Manufacturing Firms in Michigan. The University of Michigan, Institute of Science and Technology, Industrial Development Division, Ann Arbor, Mich. (Book; started 1962; EDC, 1965.)

This study contrasts the methods of finance, sources of funds, and problems encountered in R&D-oriented firms with those in other manufacturing firms. Firms included in the study were newly formed or had expanded operations since 1960. Data were collected by personal interview and a mail survey using a prestructured questionnaire for approximately 30 firms in each category.

CLEWETT, ROBERT L. AND EUGENE J. KELLEY. Integrating Technological Product Research and Development With Marketing: A Study of Organizational Structure, Information Flow, and Working Relationships. The Pennsylvania State University, College of Business Administration, Department of Marketing, University Park, Pa. (Monograph, articles; started 1964; EDC, 1965.)

The study focuses on problems of organizational structure, information flow, working relationships, and other areas of practical interest to operating managers who are concerned with integrating technological product research and development with marketing. The research procedure includes a literature search and bibliography preparation, exploratory interviews in the field, and exploratory correspondence with corporate presidents and other officers.

CROSSMAN, EDWARD R., *see* DAVIS, LOUIS E., *et al.*

DAVIS, GORDON B. The Management Science Approach in Accounting: Use of Computer Models in the Analysis and Design of Systems. University of Minnesota, School of Business Administration, Minneapolis, Minn. (Article; started 1961; EDC, 1965.)

This project is part of a larger study concerned with the management science approach in accounting. The major portion of this part concerns computer simulation of an accounting system on a simple scale. This computer model will then be used for experimentation to determine its uses and utility for analysis and design of accounting information systems.

DAVIS, LOUIS E., EDWARD R. [F. W.] CROSSMAN, AND STEPHEN LANER. Pilot Study of Evolving Jobs and Skills. University of California, School of Engineering, Department of Industrial Engineering, Berkeley, Calif. (Report, papers; started 1964; EDC, 1966.)

A series of case studies are being used to determine changes in jobs, skills, organization roles of operators, maintenance staff, specialist technicians, and firstline supervisors that are taking place in response to advances in technology. Analysis of specific tasks, skills, and roles of similar job families will be made in two or more successive levels of technology. Roles are being studied in terms of prescribed operator sequences, control of process variables, detection and rectification of faults, acquisition and transmission of information, and system coordination.

DEAN, BURTON V. **Project Evaluation and Selection.** Case Institute of Technology, Division of Organizational Sciences, Operations Research Group, Cleveland, Ohio. (Paper; started 1964; EDC, 1964.)

Mathematical models which yield solutions for allocating technical resources such as manpower, funds, equipment, and facilities to management-decision projects are constructed and solved in this study. A scoring model is constructed and then used to determine the important factors in a profitability model. The significant elements in the decision process are the uncertainty in estimating model parameter values and the optimal utilization of limited engineering manpower resources where this uncertainty exists.

———. **Quantitative Methods in Research Management.** Case Institute of Technology, Division of Organizational Sciences, Operations Research Group, Cleveland, Ohio. (Book; started 1963; EDC, 1965.)

This project will develop quantitative methods for use in industrial R&D management-decision problems at the firm, laboratory, group, and project levels. Specific undertakings will include formulation of research objectives and development of measures of performance, corporate and laboratory research budgeting, project evaluation and selection, project scheduling and control, and organization factors.

DEVRIES, MARVIN G., *see* CHASTAIN, CLARK E., *et al.*

FILLEY, ALAN C. AND ROBERT J. HOUSE. **Some Organizational Correlates of Managerial Behavior.** University of Wisconsin, School of Commerce, Madison, Wis. (Monograph, articles; started 1962; EDC, 1965.)

This project, being conducted in R&D divisions of three large manufacturing organizations, will focus on relationships between organizational variables such as the number of supervisors, span of supervision, and measures of attitudes, satisfactions, and group performance. Data are obtained through interview and testing.

FORRESTER, JAY W. Industrial Dynamics. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Started 1958.)

The project continues previously completed research resulting in the development of a methodology for studying the interactions between the principal functions of a company or industry. Present phases of the project deal with: (*1*) growth dynamics of companies, products, and markets with particular regard to relationships between research, production, marketing, and competition and (*2*) economic growth.

GATES, JAMES E. The Management of Creativity. University of Georgia, College of Business Administration, Department of Management, Athens, Ga. (Books, articles; started 1958; EDC, 1965.)

This study will integrate findings on the identification of creative talent and the climate (within industry, Government, and the university) in which it may be found. It will particularly examine concerns that cannot afford full-time research personnel and the manner in which such firms keep up with advancing technology.

GORDON, GERALD, SUE MARQUIS, AND ODIN W. ANDERSON. Organizational Setting and Scientific Accomplishment. University of Chicago, Graduate School of Business, Chicago, Ill. (Book, articles; started 1960; EDC, 1966.)

This project will compare the attitudes of directors of research projects with those of the administrators of the projects to view research structures and problems from both perspectives and to examine the possibility that differences in perception affect scientific accomplishment.

A team of equal numbers of sociologists, physicians, and health administrators will evaluate these research projects in each of four areas: (*1*) the importance of the problem studied, (*2*) how productive the research was, (*3*) how innovative the research was, and (*4*) the overall significance of the findings.

HOUSE, ROBERT J., *see* **FILLEY AND HOUSE.**

KARSH, BERNARD AND JACK SIEGMAN. Work and Organizational Correlates of Technological Change. University of Illinois, Institute of Labor and Industrial Relations, Department of Sociology, Urbana, Ill. (Book, articles; started 1958; EDC, 1964.)

The study examines impacts of electronic computer systems on work definitions and organizational variables in a civil service unit of a Government agency. The method of investigation consists of a preinstallation interview program for identification of crucial variables and a continuous observation of the subject unit during the period of accommodation to the new technology. A postinstallation interview program will identify impacts of new technology on specified variables relating to work and organization.

KELLEY, EUGENE J., *see* CLEWETT AND KELLEY.

LANER, STEPHEN, *see* DAVIS, LOUIS E., *et al.*

MARCSON, SIMON. **The Engineering Manager.** Rutgers, The State University, Department of Sociology, New Brunswick, N. J. (Book; started 1960; EDC, 1964.)

The study is a survey of the supervisory methods and practices and self-conception of the engineering manager in industry, and it will analyze personnel background and engineering functions.

———. **Policies and Practices of Research Management in Industry.** Rutgers, The State University, Department of Sociology, New Brunswick, N.J. (Book, started 1961; EDC, 1964.)

This project investigates policies and practices in the management of research in basic, applied, and engineering areas of four industries dependent on a high rate of innovation. Interviews have been conducted with research management and supervisory staffs.

MARQUIS, DONALD G. **Project Management and Performance.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1962; EDC, 1964.)

This is a comparative study of a sample of large R&D projects carried out by 50 industrial firms on Government contract. It analyzes critical factors in the history of each project in relation to project performance. Information was obtained from laboratory records, Government contracting offices, and interviews with project managers.

MARQUIS, DONALD G. AND THOMAS J. ALLEN. **Technical Quality in the Preparation of R&D Proposals.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Monograph; started 1963; EDC, 1964.)

The study gathers data on 22 R&D proposal competitions sponsored by the Department of the Air Force and the National Aeronautics and Space Administration. Data were gathered by questionnaire to explore the extent to which three sources of technical information are employed and the manner in which this information is put to use during proposal preparation. Data on the characteristics of the proposal team (size, level of education, etc.) and its parent laboratory (size ratio of engineers and scientists to total employment) were also collected. Correlations are being performed among these measures, and between the variables and a range of proposals ranked according to technical quality.

MARQUIS, DONALD G., and collaborators. Organization Research Program. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Started 1962.)

This continuing program of studies of the organization and management of large-scale technologically based enterprises emphasizes problems of information systems, control, and organization policy.

MARQUIS, DONALD G., *see* **ALLEN AND MARQUIS.**

MARQUIS, SUE, *see* **GORDON, GERALD,** *et al.*

MARTIN, ROBERT, *see* **RUBENSTEIN, ALBERT H.,** *et al.*

MCNICHOLS, THOMAS J. AND ELMER H. BURACK. Technology and Organization. Northwestern University, School of Business, Department of Business Administration, Evanston, Ill. (Articles; started 1964; EDC, 1967.)

This project focuses on the impact of technological change, involving both "information (computer) technology" and "process technology," on organization structure and practices. Two major organization units will be studied before and after a major technological change, and additional data will be gained through a more general field survey of institutions which have already sustained major changes. The latter approach will help round out extensive data obtained from the on-site studies.

QUINN, JAMES B. Planning and Control of Science and Technology. Dartmouth College, Amos Tuck School of Business Administration, Hanover, N.H. (Book, papers; started 1961; EDC, 1965.)

This is an analysis of planning practices and needs of firms for better control of science and technology programs. A section of the book will be concerned with national and international science planning. Method of the study is by interview.

RADNOR, MICHAEL, *see* **RUBENSTEIN AND RADNOR.**

RATH, GUSTAVE J., *see* **RUBENSTEIN, ALBERT H.,** *et al.*

ROBERTS, EDWARD B. Dynamics of Research and Development. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Book, articles; started 1958; EDC, 1965.)

This is an investigation of underlying causes of success and failure in the management of military research and development projects. A dynamic mathematical model of the characteristics of the firm, its military customer, and the final product has been constructed and investigated. Continuing aspects of the research are oriented principally toward development of aids to education of R&D management.

———. **Model of Laboratory Effectiveness.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1962; EDC, 1965.)

An industrial dynamics model with technical, managerial, and psychological variables will be developed to explain the causes of growth, fluctuation, and the decline of effectiveness of R&D laboratories. An initial model has been modified for use as an R&D management game and has been tested in graduate courses.

ROMAN, DANIEL D. Introduction to R&D Management. The American University, School of Business Administration, Department of R&D and Production Management, Washington, D.C. (Book; started 1964; EDC, 1965.)

The book will be a basic introductory text for senior or graduate levels and will include identification of R&D management characteristics, R&D technology, and economics of R&D organization and project management, systems, costs, etc. The method of investigation will be a research of existing literature and observation of R&D operations and problems in contractor organizations and in military and other government organizations.

———. **Managerial Implications of a Large R&D Program.** The American University, School of Business Administration, Department of R&D and Production Management, Washington, D.C. (Article; started 1964; EDC, 1965.)

This is a case study of managerial problems encountered when a large R&D firm undertakes a long-range, fixed-price R&D contract for nonmilitary purposes.

RUBENSTEIN, ALBERT H. AND MICHAEL RADNOR. Life Histories of Operations Research Management Science Groups. Northwestern University, The Technological Institute, Department of Industrial Engineering, Evanston, Ill. (Papers; started 1961; EDC, 1966.)

The study will attempt to develop a model designed to explain and predict the success or failure of "captive" groups performing operations research or management science within industrial organizations. Variables include sponsorship, organizational location, project selection strategy, results achieved, growth patterns, quality of personnel, and relations with other staff groups and with line groups. The first phase involves study of a sample of failure cases in which activity was terminated, funds were reduced, key personnel left, or useful results were not obtained in a reasonable time. The primary method of data collection is through interviews with present and former members of industrial operations research groups.

RUBENSTEIN, ALBERT H., GUSTAVE J. RATH, ROBERT MARTIN, AND JOHN WARREN. Development of New Technical Skills. Northwestern University, The Technological Institute, Department of Industrial Engineering, Evanston, Ill. (Report; started 1961; EDC, 1964.)

This study attempts to measure the time required to develop new technical skills (e.g., pertaining to inertial guidance, tunnel diodes, display systems, human factors) within an industrial or Government R&D organization. The data cover the timespan from the recognition of the need for a new skill to: (*1*) hiring or assignment of the first professional person to the area, (*2*) attainment of a satisfactory skill level, and (*3*) first effective output. The total number of man-months required to reach stage (*3*) is also included. Methods of investigation are extensive field interviewing relative to a group of miscellaneous R&D skills, a detailed historical analysis of the development of skills in one large laboratory, and a questionnaire study of some 400 organizations in the fields of human factors engineering and of lasers.

SCHWITTER, JOSEPH P. Personnel Problems of Data Processing Work Groups. Kent State University, School of Business Administration, Department of Industrial Production, Kent, Ohio. (Articles; started 1964; EDC, 1964.)

The study will ascertain the extent and severity of personnel problems typical to computer work groups through semidirective interviews with data processing managers of 18 firms representing various industries.

SIEGMAN, JACK, *see* **KARSH AND SIEGMAN.**

SPENCER, MYRON J. Strategies of Technical Product Planning. Northeastern University, College of Business Administration, Boston, Mass. (Started 1964.)

This is an investigation of the problems confronting firms responding to technical and market changes. Most of these firms, primarily in the New England area, have indicated that their sales volume may suffer from projected defense procurement cutbacks. The project tentatively will include three distinct phases: (*1*) interviews with relevant management, (*2*) development of cases for discussion and specific problems for workshop seminars, and (*3*) assembly and publication of findings and techniques.

UDY, STANLEY H., JR. Technology and Administrative Structure in Industry. Yale University, Department of Sociology, New Haven, Conn. (Book; started 1961; EDC, 1965.)

The purpose of the project is to arrive at some generalizations concerning the relationships between technological process and administrative structure in modern industry. The method of investigation includes a comparative analysis of industrial firms based primarily on data collected over the past 15 years by the Yale Technology Project under the direction of Charles R. Walker.

VAN MATRE, HARRY C., *see* CHASTAIN, CLARK E., *et al.*

WARREN, JOHN, *see* RUBENSTEIN, ALBERT H., *et al.*

WHISLER, THOMAS L. Computer Technology and the Structure of Organization. University of Chicago, Graduate School of Business, Department of Industrial Relations, Chicago, Ill. (Started 1961.)

This continuing study examines changes in organization structure (number of levels, kind of departmental groupings), control patterns, managerial job content, and managerial skill demands which are induced by use of computers and operations research techniques in business and military organizations. The method of investigation includes longitudinal case studies and industry-wide cross-sectional and longitudinal statistical comparisons.

For other projects pertaining to

ADMINISTRATION, ORGANIZATION, AND MANAGEMENT

see:

BECKER, JAMES F. Political Economy of Integration	Section 2
BERNSTEIN, IRVING, *et al.* The Changing Status of Skilled Workers in a Technologically Dynamic Industry	Section 12
BOWERS, RAYMOND V., *et al.* Impact of Technological Change on Careers in Large-Scale Organizations: A Basic Study in the Sociology of Occupations	Section 9
BRANDENBURG, RICHARD G. AND H. I. ANSOFF. Impact of Research and Development on Management Planning	Section 14
CRAFTON, L. JOSEPH. Defense Business in Michigan	Section 6
DONAT, EUGENE R. Information Technology and the Managerial Hierarchy	Section 13
ESMAN, MILTON J. AND HANS C. BLAISE. Inter-University Research Program in Institution Building	Section 10

EVAN, WILLIAM M. Conflict and Performance in R&D Organizations ———— Section 8

FOLTMAN, FELICIAN F. Electronic Data Processing Changes Supervisors' Jobs ———— Section 13

GRIFFITHS, J. C., *et al.* Operations Research in Mineral Resource Development ———— Section 14

GROSS, EDWARD. Scientists and Other Professionals in Organizations ———— Section 8

GUEST, ROBERT H. Socio-Technical Systems ———— Section 9

HESS, CARROL V. Coordinated Egg Production and Marketing Programs in Minnesota ———— Section 1

HORNE, WILLIAM J. Entrepreneurial Aspects of High-Speed Computing ———— Section 13

HUNERYAGER, S. G. Preliminary Study of Organizational Role Expectations of Leaders (Managers) and Subordinates in Engineering Research Task Groups ———— Section 8

KARSH, BERNARD AND SOLOMON B. LEVINE. Long-Run Impact of Technological and Organizational Changes on the Nature of Industrial Relations and Structure and Function of the Labor Movement in Japan ———— Section 4

LONERGAN, WALLACE G., *et al.* Attitude Surveys for Patients and Hospital Personnel ———— Section 9

LONERGAN, WALLACE G., *et al.* Marketing Managers' Responses to Automated Productivity ———— Section 7

LOVEJOY, FREDERICK A. Research and Development Project Abandonment Decisions ———— Section 14

MACNAUGHTON, JOHN F., *et al.* An Investigation of the Social, Psychological, and Economic Impacts on the Workers Affected by the Humble Oil and Refining Company's Workforce Reduction at Baytown, Texas ———— Section 12

MARCSON, SIMON. The Scientist in Government ———— Section 8

———. The University Scientist ———— Section 8

MESTHENE, EMMANUEL G. and collaborators. University Program on Technology and Society ———— Section 2

NORGREN, PAUL H. AND AARON W. WARNER. Pilot Study of Obsolescence of Scientific and Engineering Skills ———— Section 8

ODIORNE, GEORGE S. Campus Recruiting of Engineers ———— Section 8

OLIKER, L. RICHARD. An Interpretative Study of Growth and Development in the Ethical Drug Industry ———— Section 7

PRICE, DEREK J. DE SOLLA. Historical and Statistical Studies of Science, Technology, and Medicine ———— Section 3

QUINN, JAMES B. National Planning of Science and Technology in Europe ———— Section 4

REAGAN, MICHAEL D. Criteria and Processes of Priority Setting in Federal Support of Science ———— Section 6

ROBERTS, EDWARD B. Research and Development Contracting System ———— Section 6

RUBENSTEIN, ALBERT H. AND MICHAEL RADNOR. Organization of Research and Development in Decentralized Companies ———— Section 2

RUBENSTEIN, ALBERT H., *et al.* Criteria for Evaluating R&D Output ———— Section 14

SCHEIN, EDGAR H. Career Development of Researchers ———— Section 8

SECHLER, DAVID AND LOYAL M. HARTMAN. Relationship Between Firm Size and Technology Research ———— Section 2

STEVENS, J. RICHARD. Study of Administrative Uses of Computers for Instructional Cost Analysis in Colleges and Universities of the United States ———— Section 13

Strasburg, Louis G. Criteria for the Evaluation of Scientific Proposals .... Section 14

Strassmann, W. Paul. Industrial Research Organization and the Transfer of Technology to Underdeveloped Countries .... Section 10

Tybout, Richard A. Economics of Research and Development .... Section 2

Wilpuetz, Robert. Effects of Automation on Employee Morale and Productivity in a Bank: A Case Study .... Section 12

Zimmerman, Joseph F. State Governments and the Challenge of Atomic Energy .... Section 6

SECTION 6

Public Policy, Goverment, and National Defense

ALPERT, HARRY. Sociology of Science. University of Oregon, Department of Sociology, Eugene, Oreg. (Started 1963; EDC, 1965.)

This project is concerned with the sociology of science, with special reference to the interrelations of the Federal Government and the social sciences. The research considers primarily three sets of problems: (*1*) patterns of governmental conduct and support of the social sciences, (*2*) impact of the government on the social sciences, and (*3*) impact of the social sciences on governmental policies and practices. Standard sociological methods of investigation will be used, including examination of archives and other records, biographical and autobiographical materials, interviews with key informants, and consultations with especially knowledgeable individuals.

ARRINGTON, LEONARD J. AND GEORGE JENSEN. The Impact of Defense Installations and Defense Manufacturing on the Economy of Utah. Utah State University of Agriculture and Applied Science, School of Business and Social Sciences, Department of Economics, Logan, Utah. (Book, pamphlet; started 1963; EDC, 1965.)

The study will describe the establishment of various defense installations and factories in Utah, with a brief history of employment and related factors. The total impact of these enterprises on the State's economy, particularly since 1956, will be summarized. A detailed analysis will be made for the year 1963, including a modified input-output study of the defense sector of the State's economy which will be incorporated into a subsequent input-output study of the entire economy of the State.

BACON, CHARLES M., *see* ROCK, VINCENT P., *et al.*

BEASLEY, WAYNE M., *see* WEBBER, LAURANCE E., *et al.*

BENOIT, EMILE. Relation of the International Economy to Disarmament and Arms Control. Columbia University, Graduate School of Business, New York, N. Y. (Book, monographs; started 1962; EDC, 1965.)

This study will analyze major types of arms control and disarmament programs, their economic contents, and the impact of such programs on the patterns of final demand, demand for imports, and on production in defense-oriented economies. These programs might include total nuclear disarmament, partial nuclear disarmament, freezes on military technology, etc. The study also will attempt to estimate gross and net savings of world resources implied by different types of arms control. Other subjects will include impacts on the balance of payments, adjustments to disarmament impacts, and impacts on international political and economic coexistence.

BUMFORD, FORREST H., *see* WEBBER, LAURANCE E., *et al.*

CHERIAN, EDWARD J. Government Use of Incentive Contracts. Rensselaer Polytechnic Institute, School of Management, Troy, N.Y. (Dissertation; started 1963; EDC, 1965.)

This is a study of the extension of multidimensional incentives to government contractors for research, development, and production. The initial research is being restricted to studies of Defense Department contracts and, in particular, the distribution of risks and resulting profits. The three contract parameters of cost, schedule, and system performance are being studied separately and possible combinations of simultaneous incentive application will be investigated with the hope of establishing an optimizing model.

CLARK, JOHN J. The New Economics of National Defense. St. John's University, College of Business Administration, Department of Economics, Brooklyn, N.Y. (Book; started 1963; EDC, 1965.)

This book will deal with the economic, political, and psychological impacts of costs incurred in defense outlays.

CRAFTON, L. JOSEPH. Defense Business in Michigan. The University of Michigan, Graduate School of Business Administration, Bureau of Business Research, Ann Arbor, Mich. (Monograph; started 1962; EDC, 1964.)

This study will evaluate Michigan's participation in defense and space business, its related R&D resources, and problems experienced in handling defense contracts. Personal interviews have been completed in all large firms and selected small firms that have a potential for defense and space activity. Recommendations will suggest programs relating to defense and space business for implementation by individual firms, educational institutions, and civic and public agencies.

DURGIN, OWEN, *see* WEBBER, LAURANCE E., *et al.*

GLASSON, JOHN E. Federal Policy Organization for Science, 1957-62: The Congressional Position and Role. Yale University, Department of Political Science, New Haven, Conn. (Dissertation; started 1964; EDC, 1965.)

The project will study congressional response to problems of science and scientific training occasioned by the launching of the first satellite.

GRANT, CLARENCE L., *see* WEBBER, LAURANCE E., *et al.*

GREEN, CHARLES R. The Political Behavior of Scientific Organizations: The Policy Process. Oregon State University, Department of Political Science, Corvallis, Oreg. (Paper, article; started 1964; EDC, 1965.)

The preliminary research will involve design and testing of two general sets of hypotheses: (*1*) that the policy-oriented behavior of scientific organizations is in transition from the "distributive policy subsystem" to the "regulative policy subsystem" and (*2*) that scientific organizations are at a competitive disadvantage in the regulative policy subsystem.

GREEN, HAROLD P., *see* ROCK, VINCENT P., *et al.*

HOFFENBERG, MARVIN AND SIDNEY SONENBLUM. Improved Utilization of NASA-Generated Data. University of California, Institute of Government and Public Affairs, Los Angeles, Calif. (Report; started 1964; EDC, 1966.)

This is a review of the economic and technical information collected by the National Aeronautics and Space Administration in accomplishing its mission. The process by which the information is generated is being investigated to determine its usefulness for measuring the economic consequences of NASA activities. Particular attention is being given to questions of NASA impact on local areas and how NASA data can be made a more integral part of an improved Federal data system.

JENSEN, GEORGE, *see* ARRINGTON AND JENSEN.

JORDAN, ROBERT S., *see* ROCK, VINCENT P., *et al.*

KASH, DON E. International Cooperation in Space: The American Experience. Arizona State University, Department of Political Science, Tempe, Ariz. (Book, started 1962; EDC, 1964.)

This is a study of the foreign policy implications of U.S. participation in international space programs. It will attempt answers to the following questions: (*1*) what are the goals of the United States in international cooperation in space, (2) what methods or means has the United States used in programs of space cooperation, (3) are these methods or means effective, and (4) are these methods or means leading the country in the direction of unanticipated results? The method of investigation is historical and analytical.

LEISERSON, AVERY. **Science and the Political Process.** Vanderbilt University, Department of Political Science, Nashville, Tenn. (Book; started 1960; EDC, 1966.)

This study will attempt to view the effects of science upon the agenda and institutions of government in the United States. Such effects will be considered against the background of certain universal trends in the position and functioning of science in modern civilization.

LYONS, GENE M. **Science and Politics.** Dartmouth College, Department of Government, Hanover, N.H. (Book; started 1964; EDC, 1967.)

The research will result in a book of readings, with commentary, on the development of scientific agencies in the U.S. Government.

MOWITZ, ROBERT. **Technological Change and Economic Adjustment.** Wayne State University, Department of Political Science, Detroit, Mich. (Book; started 1963; EDC, 1966.)

This is a case method study of the impact of technological change in connection with weapons production and of the efforts to readjust local economies to such change. It will also analyze policy and program decisions.

NEHNEVAJSA, JIRI AND RICHARD H. POMEROY. **Impact of Civil Defense on Society.** University of Pittsburgh, Department of Sociology, Pittsburgh, Pa. (Report; started 1963; EDC, 1964.)

This report is a collection of data from professional and lay literature on major propositions and arguments which postulate various alternative civil defense measures for society. A frame of analysis for the various acceptance and nonacceptance patterns has been developed, and each statement is documented with empirical literature where possible.

NIEBURG, H. L. **Technology and Diplomacy.** University of Wisconsin, Department of Political Science, Milwaukee, Wis. (Article; started 1963; EDC, 1964.)

This historical analysis examines the connection between changing technology and foreign relations.

PENICK, JAMES L., JR., CARROLL W. PURSELL, JR., MORGAN B. SHERWOOD, AND DONALD C. SWAIN. Readings in Science and Public Policy, 1940–60. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Book; started 1963; EDC, 1964.)

Material for this book is drawn from published and manuscript sources to illuminate major facets of science and public policy from 1940 to 1960. The documents, chosen on historical principles, will be organized in four sections: (*1*) Preparedness and War, (*2*) Postwar Planning, (*3*) Rise of the Cold War, and (*4*) The Post-Sputnik Era. Each section will be introduced and annotated by one of the editors.

POMEROY, RICHARD H., *see* NEHNEVAJSA AND POMEROY.

PUFFER, FRANK. The Impact of Defense Expenditures on the San Diego Area. University of California, Bureau of Business and Economic Research, Los Angeles, Calif. (Article; started 1964; EDC, 1965.)

The primary emphasis of the study will be on the response of employment, regional income, and migration to defense expenditures during the period 1950 to 1964. The principal tool of analysis will be multiple regression, with particular attention to the estimation of the form and length of distributed lags of response of the local economy to changes in the magnitude of its various export industries. Results of the study should provide a better understanding of the interactions between defense spending and the regional economy and an improved capability for forecasting both the long-run and short-run repercussions of probable defense expenditure patterns.

PURSELL, CARROLL W., JR. Science and Government in the Great Depression, 1929–39. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Book; started 1962; EDC, 1965.)

This study will describe the impact of the depression on Government science, responses of affected agencies, proposals for greater Government activity by civilian scientists, evolving relationships between Government and civilian science, and similar problems. Materials will be drawn from documents and records of Government agencies, periodicals, and private papers of individuals involved.

PURSELL, CARROLL W., JR., *see* PENICK, JAMES L., JR., *et al.*

REAGAN, MICHAEL D. Criteria and Processes of Priority Setting in Federal Support of Science. University of California, Department of Political Science, Riverside, Calif. (Article; started 1964; EDC, 1965.)

This is an analysis of public policy issues arising out of the priorities problem of Federal support of science. A review will be made of justifications which are being used and of the scientists' role in the administrative process of establishing priorities.

———. **Government Contracting for Research and Development.** University of California, Department of Political Science, Riverside, Calif. (Started 1963; EDC, 1967.)

This project will analyze the impact of "contracting out" for scientific and technological research on the relationship between government and the rest of society. It will include an empirical review of contracting criteria and processes and an evaluation of consequences for government, industry, and universities.

ROBERTS, EDWARD B. **Research and Development Contracting System.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1962; EDC, 1966.)

This study analyzes the factors which influence government awards of research and development contracts and the extent of conflict between these practices and government objectives. Company strategies for obtaining research and development contracts are also being analyzed to determine the relative effectiveness of different approaches. Design criteria for a more effective R&D contracting system are being developed.

———. **Technology Utilization: Role of New Enterprises "Spun Off" from Government-Sponsored R&D Organizations.** Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1964; EDC, 1966.)

The project will attempt to determine the extent of company spin-offs from government-sponsored laboratories, their effect on the economy, the factors influencing their formation, and early success or failure. A partial measure of defense-space technology utilization will be established and will provide recommendations for stimulating new company spin-offs. By drawing the initial sample from university laboratories, the project will document one direct means of university impact on the local community.

ROCK, VINCENT P., CHARLES M. BACON, HAROLD P. GREEN, AND ROBERT S. JORDAN. **Program of Policy Studies in Science and Technology.** George Washington University, Program of Policy Studies in Science and Technology, Washington, D.C. (Books, articles, papers; started 1964.)

This continuing project will study various aspects of science in government policy. The particular points of view to be covered are: (*1*) government policy regarding scientific research and development, (*2*) scientific methods used in determining policy, and (*3*) impact of science and technology in various sectors of society. Initial studies have concentrated on different aspects of space exploration. Some of the topics under consideration are oriented to a specific current policy problem; others examine certain scientific and technological developments in the United States in a historical sense.

ROSEN, SAM, *see* **WEBBER, LAURANCE E.,** ***et al.***

ROTH, SIDNEY G. National Aeronautics and Space Administration and University Relations. New York University, Office of Research Services, New York, N.Y. (Report; started 1963; EDC, 1964.)

This is a survey of the impact of the National Aeronautics and Space Administration science and engineering programs on colleges and universities in terms of curriculum development, manpower, facilities, and research activities.

SCHILLING, WARNER R. The H-Bomb Decision. Columbia University, Department of Government, New York, N.Y. (Book; started 1956; EDC, 1965.)

The study examines pertinent events within the Government from the time of the first Soviet atomic explosion in September 1949 to the decision by President Truman regarding development of the H-bomb. The method of study includes analysis of public hearings and interviews with participants.

SEIBERLICH, JOSEPH, *see* **WEBBER, LAURANCE E.,** ***et al.***

SHERWOOD, MORGAN B., *see* **PENICK, JAMES L., JR.,** ***et al.***

SINGER, J. DAVID. Weapons Technology and Its Impact on the Frequency and Magnitude of International War. The University of Michigan, Mental Health Research Institute, Ann Arbor, Mich. (Articles; started 1964; EDC, 1966.)

Measures of weapon speed, destruction radius, lethality, etc., will be developed for use as independent variables in seeking correlations with the frequency and magnitude of war. The period to be covered is 1815 to 1965.

SONENBLUM, SIDNEY, *see* **HOFFENBERG AND SONENBLUM.**

SWAIN, DONALD C. Federal Government and Natural Resources, 1933–60. University of California, Department of History, Davis, Calif. (Book; started 1962; EDC, 1967.)

This study of Federal conservation policy is based on primary historical sources. It places special emphasis on the scientific aspects of the various resource programs, and examines the scientific and conservation policies of the U.S. Department of Agriculture and the U.S. Department of the Interior.

SWAIN, DONALD C., *see* **PENICK, JAMES L., JR.,** *et al.*

WEBBER, LAURANCE E., FORREST H. BUMFORD, JOSEPH SEIBERLICH, CLARENCE L. GRANT, WAYNE M. BEASLEY, OWEN DURGIN, AND SAM ROSEN. Methods of Evaluation of Cost of Air Pollution. University of New Hampshire, College of Technology, Engineering Experiment Station, Durham, N.H. (Paper; started 1962; EDC, 1964.)

The objective of this project is to develop a method of ascertaining the cost of air pollution. The team of investigators includes specialists in engineering, public health surveys and instrumentation, chemical analysis, physics, economics, and statistics.

WEIDENBAUM, MURRAY L. and collaborators. Economic Implications of the National Space Program. Washington University, Department of Economics, St. Louis, Mo. (Book, articles, papers; started 1963.)

This project is analyzing various economic implications and impacts of the National Aeronautics and Space Administration and related Federal agency expenditures. Specific aspects to be explored include the impacts of such expenditures on regional economies, market structure of space- and defense-related industries, interindustry and interfirm relations, and the requirements for skilled manpower.

ZIMMERMAN, JOSEPH F. State Governments and the Challenge of Atomic Energy. Worcester Polytechnic Institute, Department of Economics, Government, and Business, Worcester, Mass. (Article; started 1963; EDC, 1966.)

The study will deal with efforts of State governments to meet the challenges of atomic energy. Major areas to be covered are promotion of the use of atomic energy, radiation protection programs, atomic educational programs in State institutions of higher education, and transfer of certain regulatory authority from the United States Atomic Energy Commission to the States.

For other projects pertaining to

PUBLIC POLICY, GOVERNMENT, AND NATIONAL DEFENSE

see:

ALKER, HAYWORD R., JR. AND RONALD BRUNNER. Relations Among Scientific, Political, and Economic Development ________ Section 2

ALLEN, THOMAS J., JR. AND DONALD G. MARQUIS. Information Requirements for Research and Development ________ Section 5

Ashford, Douglas E. National Development and Local Reform — Section 4

Bangs, Robert B. and John F. Creed. Tax Problems Connected With Patents and Related Industrial Property — Section 11

Baranson, Jack. Diesel Engine Manufacturing in Less Developed Countries — Section 10

Basalla, George. Science and Government in England: 1660–1918 Section 4

Basiuk, Victor. Technological Change and the Balance of Power — Section 4

Bennett, John W. Habitat, Institutions, and Economic Development in Saskatchewan: Studies in the Cultural Ecology of the Great Plains — Section 4

Bottum, John S. and Mervin G. Smith. Analysis of the Impact of Past and Present Agricultural Policies on the Quantities of Agricultural Products Marketed, Channels Used in Marketing, and Market Structure in Ohio — Section 1

Cliffe, Frank B. and Eugene S. Uyeki. Science, the Scientist, and the Government — Section 8

Comanor, William S. Economics of Research and Development in the Pharmaceutical Industry — Section 7

De Grazia, Alfred. Social Invention — Section 9

Donat, Eugene R. Information Technology and the Managerial Hierarchy — Section 13

Dupree, A. Hunter. Studies in the History of Science in the Federal Government, 1940–60 — Section 3

Eisenberg, Walter L. Migratory Farm Labor: A Federal Policy Alternative — Section 12

Estep, Samuel D. Doing Nuclear Business Across International Lines — Section 4

Estep, Samuel D. and Edward H. Forgotson. Radiation Exposures and Their Legal Impact — Section 13

Glade, William P., Jr. The Latin American Economies: A Study of Their Institutional Evolution — Section 4

Grigg, Charles M. and Robert M. Griffin, Jr. The Impact of the Space Program on Community and Governmental Organization — Section 9

Hamberg, Daniel. Economics of Research and Development — Section 2

Hardin, Einar. Economic Benefits and Costs of Retraining Programs for Unemployed Workers — Section 12

Harris, L. James and Irving H. Siegel. Role of Industrial and Intellectual Property in Latin America — Section 11

Higham, Robin. Production and Politics: A Study of the British Aircraft Industry — Section 4

Hirsch, Walter. Science Under the Nazis — Section 3

Homan, Paul T. and Wallace F. Lovejoy. Economic Impact of State Petroleum Conservation Regulation — Section 7

Karsh, Bernard and Jack Siegman. Work and Organizational Correlates of Technological Change — Section 5

Mansfield, Edwin. The Economics of Innovation and Technical Change — Section 2

Marcson, Simon. The Scientist in Government — Section 8

Marquis, Donald G. Project Management and Performance — Section 5

Mesthene, Emmanuel G. and collaborators. University Program on Technology and Society — Section 2

Nehnevajsa, Jiri, *et al.* Anticipations of Cold War Futures — Section 4

Norgren, Paul H. and Aaron W. Warner. Pilot Study of Obsolescence of Scientific and Engineering Skills — Section 8

PATERSON, ROBERT W., *et al.* Agglomeration Economies in Scientific Research: A Criterion for Allocating Federal Research Expenditures .... Section 2

PILISUK, MARC. Psychological Commitment to Roles in a Defense-Oriented Social System .... Section 9

PLUNKETT, JERRY D. AND JOHN S. GILMORE. NASA Contributions to Inorganic Coating Technology .... Section 13

PRESTON, LEE E. History of Communications Satellite Corporation Section 7

PRICE, DEREK J. DE SOLLA. Historical and Statistical Studies of Science, Technology, and Medicine .... Section 3

QUINN, JAMES B. National Planning of Science and Technology in Europe .... Section 4

ROBERTS, EDWARD B. Dynamics of Research and Development .... Section 5

SAMPSON, ROY J. Transportation as a Factor in Regional Development .... Section 7

SCHILLING, WARNER R. Admirals and Foreign Policy .... Section 3

SKOLNIKOFF, EUGENE B. Science and Technology in Policy-Making for Foreign Affairs .... Section 4

SPENCER, MYRON J. Strategies of Technical Product Planning .... Section 5

STEPHENS, STEPHEN V. Consensus Formation in Government Science Policy .... Section 14

STEWART, CHARLES T., JR. A Study of the Role of Changing Regional Patterns of Research and Development and Science-Based Technology in Influencing Regional Development .... Section 2

STRASBURG, LOUIS G. Criteria for the Evaluation of Scientific Proposals .... Section 14

TOLLEFSON, JOHN O. An Approach to Defense-Aerospace Marketing and Market Planning .... Section 8

WATSON, DONALD S. AND MARY A. HOLMAN. Productivity of Federally Financed Research and Development .... Section 2

WEISER, GERALD J. Role of Industrial and Intellectual Property in the European Economic Community .... Section 11

WELLS, HERMAN B., *et al.* Aerospace Research Applications .... Section 2

WHITTED, STEPHEN F. Market Organization and Structure of the Missouri Dairy Industry .... Section 1

WOOD, ROBERT C. Policy-Making Implications of Large-Scale Government Research Programs .... Section 14

SECTION 7

Impacts on Selected Industries

AMES, EDWARD. **Technological Change in the Telephone Industry.** Purdue University, Department of Industrial Management and Economics, Lafayette, Ind. (Book; started 1959; EDC, 1964.)

This is a statistical study of the flow of new research into development and the flow of development into the operations of the telephone industry.

BREWER, DAWSON E., *see* RUBENSTEIN AND BREWER.

BUTZ, W. T. AND C. W. PIERCE. **Milk Assembly, Processing, and Distribution Systems and Practices.** The Pennsylvania State University, School of Agriculture, Department of Agricultural Economics and Rural Sociology, University Park, Pa. (Bulletin, Dissertation; started 1964; EDC, 1968.)

Fluid milk firms have expanded markets beyond local areas of distribution because of improvements in transportation systems and equipment, and technological changes in milk packaging in recent years. The study will: (*1*) describe the methods and equipment employed by handlers engaged in outer-market distribution, (*2*) estimate costs to distribute outer-market milk, and (*3*) determine the most efficient systems for distributing milk in outer markets. To accomplish these objectives, delivery systems presently being used to serve outer markets are being observed in several major markets in Pennsylvania. Analysis of the data will emphasize differences in labor productivity among the several systems of distribution.

COLWELL, LESTER V., *see* SCHULTZ, STUART J., *et al.*

COLWELL, LESTER V., *see* WILSON, C. CARL, *et al.*

COMANOR, WILLIAM S. **Economics of Research and Development in the Pharmaceutical Industry.** Harvard University, Department of Economics, Cambridge, Mass. (Articles; started 1961; EDC, 1965.)

This is a study of the role and function of research in the pharmaceutical industry. It will emphasize the relationship between research and market

structure and consider some problems of public policy. In addition, an empirical study will be made of the economies of scale in research within this industry.

COTTRELL, W. FREDERICK. **Impact of Technological Change on Railway Workers in the United States, Britain, and New Zealand.** Miami University, Department of Sociology and Anthropology, Oxford, Ohio. (Paper; started 1963; EDC, 1965.)

This study compares the effects of technological changes on railway workers in the United States with those in Britain and New Zealand. The comparisons will extend to modification of institutions, the changing character of the role and status of the workers, and the values and attitudes involved. The method consists primarily of field interview. An effort will be made to assess the degree to which ideological orientation, such as that toward socialism as against free private enterprise, is involved and this will be compared with pressures exerted by various groups interested in the railroads, e.g., shippers, passengers, investors, and workers.

COUPE, JOHN D. **Impact of the Space Program on the Rubber Industry.** University of Maine, School of Business Administration, Department of Economics, Orono, Maine. (Articles; started 1963; EDC, 1964.)

This article will analyze the growth and development of firms in the rubber industry and the impact of the space program on sales, product development, capital expenditures, employment, and other important variables.

COWAN, DONALD R. G. **Growth Requirements of the Steel Industry.** The University of Michigan, Graduate School of Business Administration, Ann Arbor, Mich. (Book; started 1958; EDC, 1964.)

This book will examine the place of the steel industry in the economy, its growth from 1900 to 1960, and its prospects for growth over the next 10 to 15 years. It will appraise the effects of technological change on steel operations and the anticipated developments. The study will also explore the sources of funds for expansion from 1900 to 1940, during World War II, and during postwar periods. The problem of expansion of the industry in the years ahead will be clarified, and an appraisal of various methods of attempting to provide required capital will be made.

FARRIS, HANSFORD W., *see* SCHULTZ, STUART J., *et al.*

FOGEL, WALTER A. **Technological Change and the Work Force in Retail Trade.** University of California, Graduate School of Business, Department of Industrial Relations, Los Angeles, Calif. (Monograph; started 1963; EDC, 1964.)

This study will measure employment changes in various kinds of businesses within the retail trade industry during the years 1929-62. The relation of

productivity to employment change and of technological change to productivity change will be investigated. Surveys of specific technological change and its direct effect on the work force will also be made. The study will concentrate on the California area, with national comparisons.

FRANZ, VERL R., *see* LONERGAN, WALLACE G., *et al.*

GOLDBERG, JOSEPH, *see* LEVINSON, HAROLD M., *et al.*

HEATH, MILTON S. **Business Integration in the Textile Industry, 1936–58.** University of North Carolina, School of Business Administration, Department of Economics, Chapel Hill, N.C. (Book; started 1957; EDC, 1965.)

This study concerns the profound changes in technology, business organization and management, and market structure of the American textile industry since the early 1930s. It will attempt to trace the major outlines and weigh the casual factors in this "revolution." The method of study includes analysis of industry data in reports and journals, study of technical sources and observation of work in leading testing laboratories, and extensive interviews with textile management and observation of plant operations.

HOMAN, PAUL T. AND WALLACE F. LOVEJOY. **Economic Impact of State Petroleum Conservation Regulation.** Southern Methodist University, Department of Economics, Dallas, Tex. (Book, articles; started 1963; EDC, 1964.)

This study will analyze interelationships of the legal, economic, and technological factors in petroleum conservation, and the implications for State and national fuel policies. The project will involve work with industry, State and Federal Regulatory agencies, and various groups studying related problems. It will also include a formal conference with economists, engineers, regulators, and lawyers.

KAHN, MARK, *see* LEVINSON, HAROLD M., *et al.*

KLUCKHOHN, RICHARD. **Ecological and Biogeographical Consequences of Massive Technological Enterprises: The Space Program as a Case Study.** Boston University, Department of Sociology and Anthropology, Boston, Mass. (Article; started 1963; EDC, 1965.)

This article will be the product of a series of panel discussions on biological, geographic, and anthropological factors involved in the National Aeronautics and Space Administration projects and installations. It will contain definitions of the profitable research areas and will conclude with 10 specific recommendations for further research.

KRAMER, HELEN M. **Economic Impact of the Aircraft, Missiles, and Electronics Industries in the United States, 1950–61.** University of Wisconsin, Department of Economics, Madison, Wis. (Dissertation; started 1962; EDC, 1964.)

The model will measure the effects of changes in employment and of the distribution, by State, of military prime contracts on levels of State personal income and status of growth for the period 1950-61. Aircraft, missiles, and electronics industries will be studied.

LANG, HERBERT H. **History of Uranium Mining in the United States.** Texas A&M University, Department of History and Government, College Station, Tex. (Book; started 1960; EDC, 1965.)

This is a study of the origin, growth, and present status of the uranium mining and processing industry in the United States. It emphasizes technological developments in mining, economic and social implications of the industry, and the role of the Federal Government in stimulating and controlling mining. Prime sources for the study are personal interviews and Government and other publications.

LEAMING, GEORGE F. **Changes in the Composition of the Labor Force in the Primary Copper Industry.** University of Arizona, College of Business and Public Administration, Bureau of Business and Public Research, Tucson, Ariz. (Book, dissertation; started 1963; EDC, 1964.)

This project involves determination and measurement of significant trends in the composition of the labor force for the primary copper industry of the United States that have resulted from technological and other changes in the industry. The composition of the industry's work force is being studied with respect to skill level, pay grade, type of job performed, and type of industrial operation involved. Data have been obtained from the records of copper producing firms and from other private and public sources and are being analyzed to show numbers and percentages of persons in separate job categories for selected periods from 1946 to 1963. Trends in these numbers and percentages are to be computed and projected to 1975.

LEVINSON, HAROLD M., CHARLES M. REHMUS, MARK KAHN, AND JOSEPH GOLDBERG. **Manpower Adjustment to Technological Innovation in American Transportation.** The University of Michigan, Institute of Labor and Industrial Relations, Ann Arbor, Mich. (Books; started 1964; EDC, 1966.)

Each investigator will undertake a study of one of the four basic transportation industries (trucking, railroad, airline, and maritime) based on interviews, manpower surveys, and case histories of effects of technological changes on manpower. The basic industry studies will be followed by a separate cross-sectional analysis of all transportation industries.

LONERGAN, WALLACE G., VERL R. FRANZ, AND HENRY L. PORTER. Marketing Managers' Responses to Automated Productivity. University of Chicago, Industrial Relations Center, Chicago, Ill. (Article; started 1964.)

This is a study of problems in the marketing organization that result from automated production processes, with particular attention to salesmen's attitudes and responses. An analysis will be made of interviews and questionnaires which cover the attitudinal structure and social isolation factors among salesmen in an oil refining and distribution industry, and their response to hard competition arising from automated refining practices.

LOVEJOY, WALLACE F., *see* HOMAN AND LOVEJOY.

MAHAR, JAMES F. AND LLOYD G. MARTS. Impact of Automation on Employment in the Power Laundry Industry—Preliminary Analysis. University of Denver, Denver Research Institute, Denver, Colo. (Report; started 1964; EDC, 1965.)

The objective of the research is to develop methodology which will permit forecasting the impact of automation on the quantity of employment and required skill levels in the power laundry industry. Data are being collected in geographically dispersed representative plants and from equipment manufacturers. Mechanization profiles are being constructed for individual plants as aids to the analysis.

MARKHAM, JESSE W. The Determination of the R&D Budget in a Large Diversified Corporation. Princeton University, Department of Economics, Princeton, N.J. (Article; started 1964; EDC, 1965.)

The article will consist of a statistical analysis of quantitative and qualitative data and use of this analysis in determining the R&D budget of a large corporation.

MARTS, LLOYD G., *see* MAHAR AND MARTS.

MILLER, E. WILLARD. Evolution of the Economy of the Appalachian Coal Region. The Pennsylvania State University, School of Mineral Industries, Department of Geography, University Park, Pa. (Paper; started 1963; EDC, 1965.)

This study evaluates changes in regions where, as a result of advancing technology, the dominant coal industry is in decline and new economic activities are being imposed on the traditional economic patterns. Census data will be used in the investigation.

Miller, Ronald E. and David Sawers. Efficiency in Commercial Air Transportation and Innovations in the Aircraft Industry. University of Pennsylvania, Philadelphia, Pa., and Princeton University, Department of Economics, Princeton, N. J. (Sawers). (Book; started 1961; EDC, 1965.)

The study surveys improvements in efficiency in the operation of commercial aircraft from the early 1920's to the present and attempts to relate them to technological innovations in the aircraft industry.

Moyer, Reed. Competition in the Midwestern Coal Industry. Michigan State University of Agriculture and Applied Science, College of Business and Public Service, Department of Marketing and Transportation, East Lansing, Mich. (Book; started 1961; EDC, 1964.)

This project will study the industrial organization of the coal industry in the midwestern United States and the influence of market structure and market conduct on industry performance. It will include analysis of the impact of technological conditions and changes in the industry. Analyses of secondary government and industry records, results of survey questionnaires, and personal interviews will also be made in addition to theoretical generalizing.

Oliker, L. Richard. An Interpretative Study of Growth and Development in the Ethical Drug Industry. Indiana University, Graduate School of Business, Bloomington, Ind. (Dissertation; started 1964; EDC, 1966.)

This is a study of industry practices and policies in relation to the growth and structure of the ethical drug industry. It will examine the nature of competitive conditions, research and development, innovations, and pricing policies, with special attention to the industry in Indiana. The method of investigation will be a review of the literature, with considerable dependence on data from trade associations and specific companies.

Pierce, C. W., *see* Butz and Pierce.

Porter, Henry L., *see* Lonegran, Wallace G., *et al.*

Preston, Lee E. History of Communications Satellite Corporation. University of California, Berkeley Space Science Laboratory, Berkeley, Calif. (Book; started 1963.)

The purpose of the project is: (*1*) to compile a comprehensive history of the development of the Communications Satellite Corporation and (*2*) to examine this institutional innovation against the history of other government-private economic ventures, both in the United States and abroad. Conclusion of the project should permit an evaluation of this organizational form, identification of expected problems and strength, and possibilities for future use of mixed enterprise in other economic areas.

PRIEN, CHARLES H., *see* **WELLES AND PRIEN.**

QUACKENBUSH, LELAND J., *see* **SCHULTZ, STUART J.**, *et al.*

REHMUS, CHARLES M., *see* **LEVINSON, HAROLD M.**, *et al.*

ROSSE, JAMES N. Impact of Technological Change and Economies of Scale on the Structure of the American Daily Newspaper Industry. University of Minnesota, Department of Economics, Minneapolis, Minn. (Dissertation; started 1963; EDC, 1965.)

This project consists of constructing a general theory of the newspaper firm. Hypotheses will be established concerning newspaper technology and economies of scale and will be subject to empirical tests.

RUBENSTEIN, ALBERT H. AND DAWSON E. BREWER. Sources of Research and Development Achievements in Electronics Since 1945. Northwestern University, Technological Institute, Department of Industrial Engineering and Management Sciences, Evanston, Ill. (Articles; started 1962; EDC, 1965.)

The study will attempt to relate the incidence of research and development achievements in electronics to certain characteristics of the organizations reported to have been responsible for them.

SAMPSON, ROY J. Transportation as a Factor in Regional Development. University of Oregon, School of Business Administration, Department of Marketing, Insurance, and Transportation, Eugene, Oreg. (Book, articles; started 1949.)

This is a historical and theoretical examination of transport systems and their interactions with economic and social systems in the United States and in other countries. Emphasis is being given to the impact of changing transportation technologies.

Case studies of particular industries and regions have been undertaken with the intent of developing a theoretical framework for answering policy questions concerning public and private actions to promote maximum utilization of limited transport resources.

SAWERS, DAVID, *see* **MILLER AND SAWERS.**

SCHMIDT, ALFRED O., *see* **SCHULTZ, STUART J.**, *et al.*

SCHMIDT, ALFRED O., *see* **WILSON, C. CARL**, *et al.*

SCHULTZ, STUART J., LESTER V. COLWELL, HANSFORD W. FARRIS, LELAND J. QUACKENBUSH, AND ALFRED O. SCHMIDT. **The Use of Advanced Technology in the Tool and Die Industry of Michigan.** The University of Michigan, Institute of Science and Technology, Industrial Development Division, Ann Arbor, Mich. (Book; started 1964; EDC, 1965.)

This is a survey of the tool and die industry in Michigan to determine the current extent of adoption of new technology and to determine attitudes toward acceptance of new technology in the future. Data will be collected from a sample of 170 firms by personal interview, using a prestructured questionnaire, on products, markets, equipment, and technologies in use, attitudes and plans for using new technologies in the future, new product plans, and present and anticipated financial and sales position of the industry.

STEKLER, HERMAN O. **Technical Progress in the Aerospace Industry.** University of California, School of Business Administration, Berkeley, Calif. (Paper; started 1964; EDC, 1965.)

This is an economic evaluation of technological progress in the aerospace industry.

WELLES, JOHN G. AND CHARLES H. PRIEN. **Oil Shale: Economic Implications of a New Industry.** University of Denver, Denver Research Institute, Joint Chemical and Economics Division, Denver, Colo. (Articles; started 1957.)

This continuing study concerns the improvements in oil shale technology, making feasible the initiation of an oil shale industry in western Colorado. There, at 1 million barrels per day, this industry will create a new city of 340,000 people in a region where only 3,000 now reside. The impacts of this industry on the region, the State, and the Nation are being studied. Because the petroleum industry is worldwide, international implications are also involved.

WILSON, C. CARL, LESTER V. COLWELL, AND ALFRED O. SCHMIDT. **Metalworking Research in United States, Japanese, and European Universities and Institutes.** The University of Michigan, Institute of Science and Technology, Industrial Development Division, Ann Arbor, Mich. (Wilson and Colwell), and The Pennsylvania State University, School of Engineering, University Park, Pa. (Schmidt). (Books; started 1962; EDC, 1965.)

A book will be devoted to each of the three areas listed in the title of the study. Data will be obtained on the following topics: (*1*) amount of effort in man-months, currency expenditure, and length of time devoted to specific technical fields; (*2*) number and level of academic training of research personnel and number of supporting staff; (*3*) sponsorship of research; and (*4*) extent of basic versus applied research. Research will be conducted by mail survey and, in the case of Europe, will be supplemented by personal interview.

Yavitz, Boris. Bank Automation—Its Process and Impacts: A Case Study and Conceptual Analysis. Columbia University, Graduate School of Business, New York, N.Y. (Dissertation; started 1963; EDC, 1964.)

The process by which the electronic computer was introduced to commercial banks and impacts of the computer are being examined. A nationwide survey by the American Bankers Association, data from consultant experience, and direct interviews with bank officers are the primary sources of information. A conceptual scheme, or model, to interpret the process of computer automation is being developed, and both current and predicted impacts will be traced to the conceptualized process.

For other projects pertaining to

IMPACTS ON SELECTED INDUSTRIES

see:

Ammer, Dean S. and Ernest M. DeCicco. Automation and Its Effect on Employment in the Gray Iron Foundry Industry ____ Section 14

Bacon, Frank R., Jr. A Firm-Level Study of the Effect of Science and Technology on Economic Growth ____ Section 2

Bernstein, Herbert M. Analysis of the Postwar Growth of the Japanese Photographic Industry ____ Section 4

Bertholf, William E., II. Mineral Resource Socioeconomics ____ Section 5

Chappell, Joseph S. and William D. Toussaint. An Economic Analysis of the Influences of Various Harvesting and Curing Methods on the Grade-Price Relationships and on Harvesting and Curing Costs of Flue-Cured Tobacco ____ Section 1

Chihote, Ronald H. The Spanish Iron and Steel Industry: The Role of Heavy Industry in a Developing Nation ____ Section 4

Coe, Rodney M. and Albert F. Wessen. Acceptance of an Innovation ____ Section 9

Fienup, Darrell F. and Dale C. Dahl. Minnesota Agribusiness Structural Adjustment in the Agribusiness Sector of the Minnesota Economy ____ Section 1

Gold, Bela. Effects of Technological Innovations in the Steel-Producing and Steel-Using Industries on Natural Resource Requirements ____ Section 13

Gold, Bela, *et al.* Major Technological Change: A Case Study in the British Steel Industry ____ Section 4

Griffiths, J. C., *et al.* Operations Research in Mineral Resource Development ____ Section 14

Gross, Andrew C. Technological Change, Manpower Utilization, and Educational Qualifications; Some Preliminary Investigations in a Canadian Setting ____ Section 4

Heiden, Edward J. Some Economic Implications of United States Communications Satellite Policy ____ Section 13

Hess, Carroll V. Coordinated Egg Production and Marketing Programs in Minnesota ____ Section 1

HIGHAM, ROBIN. Production and Politics: A Study of the British Aircraft Industry Section 4

HOGLUND, C. RAYMOND. Adjustments in Dairy Farming To Meet Changing Conditions Section 1

KLINE, RALPH G. Economic Appraisal of Farming Adjustment Opportunities in Southside Virginia Section 1

KORZAN, GERALD E. Impact of Changes in Market Structure and Technology on the Beef Cattle Industry Section 1

KRIESEL, HERBERT C. Some Changes in Interregional Competitive Relationships for Broilers and Eggs With Particular Reference to West Virginia Section 1

LIU, TA-CHUNG AND GEORGE H. HILDEBRAND. Manufacturing Production Functions in the United States Section 2

LONERGAN, WALLACE G. *et al.* Attitude Surveys for Patients and Hospital Personnel Section 9

MARCSON, SIMON. The University Scientist Section 8

MENZEL, HERBERT AND ROLF MEYERSOHN. Physicians' Information Section 8

MESTHENE, EMMANUEL G. and collaborators. University Program on Technology and Society Section 2

PAWSON, WALTER W., *et al.* Economics of Adjustments in Beef Production in Arizona Section 1

POLOPOLUS, LEO AND FRED H. WIEGMANN. Economic Potential for Additional Vegetable Processing Facilities in South Central Louisiana Section 1

SAVAGE, CHARLES H., JR., AND W. G. BENNIS. Human and Organizational Consequences of Two Computer Installations in South America Section 4

SCHLEBECKER, JOHN T. Scientific and Technical Development of American Agriculture Section 1

SELTZER, GEORGE. Manpower Assessment of the Iron Ore Industry Section 12

SIEGEL, IRVING H. AND EDGAR WEINBERG. Role of Patents in the Evolution of Established Firms Section 11

SOMMERS, LAWRENCE M. Regional Impact of Technological Developments Upon the Farming-Fishing Economy of Northern Norway Section 4

SUNDQUIST, WESLEY B. AND HARALD R. JENSEN. Adjustments of Farm Production and of the Structure of Farming in Minnesota to Economic Change Section 1

SUSSKIND, CHARLES. History of Electronics Section 8

VOSS, LEONARD A. Effect of Coordinated Egg Production-Marketing Technology Upon Market Channels and Institutions in Missouri and the North Central States Section 1

WALKER, ODELL L. Economic Efficiency in the Production of Field Crops in Oklahoma Section 1

WEST, JERRY G. Secondary Economies in Concentration of Production of Dairy, Fruit, and Poultry Products Section 1

WHITTED, STEPHEN F. Market Organization and Structure of the Missouri Dairy Industry Section 1

WILLIAMS, LAWRENCE K. Impact of Automation on Management Decision-Making and on Job Structure Section 14

WILPUETZ, ROBERT. Effects of Automation on Employee Morale and Productivity in a Bank: A Case Study Section 12

YOUNG, JAMES E. Development of Methodology for the Study of Employment Effects of Automation in Selected Arizona Industries Section 12

SECTION 8

Scientific and Engineering Manpower, Performance, Education, and Creativity

ANDREWS, FRANK M., *see* **PELZ AND ANDREWS.**

ARONSON, ROBERT L. Labor Markets for Scientific and Professional Manpower: Structure and Functioning. Cornell University, School of Industrial and Labor Relations, Department of Labor Economics and Income Security, Ithaca, N.Y. (Monograph, articles; started 1963; EDC, 1967.)

This study of labor markets for highly talented manpower will emphasize manpower allocation and utilization. It will include an attempt to determine the extent to which labor market efficiency explains the relatively low unemployment rates among high-talent manpower despite rapid expansion in this area. Job and work histories will be the principal research tool, and results of the study are expected to have application to problems such as skill shortages and interindustry transferability of trained manpower that result from changes in demand and technological innovation.

BASS, HENRY L. Statistical Study of the Educational Background of Management With Special Reference to Scientists and Engineers. Harvard University, Department of Economics, Cambridge, Mass. (Dissertation; started 1960; EDC, 1964.)

Questionnaires were answered by over 6,000 top and middle managers in 122 leading corporations of the major industries. An additional 190 companies of all sizes and industries were surveyed on a companywide basis, and the findings were compared with the first group. A preliminary report consisting mostly of tables has been completed and is available.

BAYLY, MAURICE B., *see* **PARSEGIAN, V. LAWRENCE,** *et al.*

BOELTER, L. M. K. AND ALLEN B. ROSESTEIN. Educational Development Program. University of California, College of Engineering, Los Angeles, Calif. (Reports; started 1960; EDC, 1965.)

This program is designed to: (*1*) study, effectuate, and evaluate an undergraduate engineering curriculum; (*2*) study and modify the graduate engineering course of study in the discipline of research; and (*3*) study, construct, and develop the framework for a graduate engineering course of study resting on the discipline of design.

BOELTER, L. M. K., *see* **McILVAINE, WILLIAM D.,** *et al.*

CARTER, RICHARD L., *see* **PARSEGIAN, V. LAWRENCE,** *et al.*

CLIFFE, FRANK B. AND EUGENE S. UYEKI. Science, the Scientist, and the Government. Case Institute of Technology, Department of Humanities and Social Studies, Cleveland, Ohio. (Articles; started 1961; EDC, 1966.)

This is a study of men performing roles associated with science and public policymaking. The research is being conducted by content analyses of selected documents, by studies of career lines of Government scientists, and by interview and questionnaire surveys: (*1*) scientists in Government, (*2*) nonscientists in Government concerned with science and public policy, and (*3*) scientists without formal governmental roles.

COLEMAN, EDWARD P., *see* **McILVAINE, WILLIAM D.,** *et al.*

EVAN, WILLIAM M. Conflict and Performance in R&D Organizations. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Book; started 1963; EDC, 1965.)

The effects of different types of conflicts on the performance of engineers and scientists will be investigated in light of the general belief that all kinds of organizational conflicts are disruptive and should be minimized. A survey has been conducted of project teams of engineers and scientists in government and in industrial laboratories. The feasilility of extending this study to an academic research organization is being explored.

FERDINAND, THEODORE, *see* **RAPOPORT, ROBERT N.,** *et al.*

FRANKE, WALTER H. Evaluation of Training and Recruitment Problems for Selected Technical Occupations in Short Supply. University of Illinois, Institute of Labor and Industrial Relations, Urbana, Ill. (Report, articles; started 1963; EDC, 1965.)

Objectives of the study are: (*1*) to analyze several of the new or rapidly expanding technical occupations that require specialized training beyond high school and in which there currently exists a critical need for "more and better trained workers," (*2*) to determine the causes of the short supply of human resources in these occupations by examining relevant variables which affect entry, and (*3*) to evaluate the effectiveness of labor market processes and institutions in reducing this need. Job placement agencies are the source of data on the scope and nature of the shortages. Causes, as they relate to the functioning of training and placement institutions, will be analyzed by means of interview data from employers and their employees.

GERSTL, JOEL E. AND ROBERT PERRUCCI. The Engineer and Society. Purdue University, Department of Sociology, Lafayette, Ind. (Book; started 1964; EDC, 1966.)

The study will examine four stages in the careers of engineers and will cover: (*1*) relationship between background, personality, and occupational choice pattern; (*2*) implications of technical and social education for the social and political responsibilities of engineers; (*3*) implications of work in large bureaucratic settings for the engineering profession; and (*4*) relationship between career patterns and success.

GLASER, BARNEY G. The Changing Identity of American Scientists. University of California, School of Nursing, Department of Sociology, San Francisco, Calif. (Monograph; started 1964; EDC, 1966.)

This project will explore changes in the professional and work identity of scientists as they change their employment from the university to research organizations. The method of investigation will be a secondary analysis of a sample of chemists.

———. The Underproductive Scientist. University of California, School of Nursing, Department of Sociology, San Francisco, Calif. (Article; started 1964; EDC, 1966.)

The career fate of those scientists in research organizations who are considered to be below average producers will be investigated by analyzing a survey of a large research organization.

GOE, GEORGE, *see* **PARSEGIAN, V. LAWRENCE,** *et al.*

GORDON, GERALD AND DUNCAN NEUHAUSER. A Comparative Study of Research in the Life Sciences in Twelve Different Organizations. University of Chicago, Graduate School of Business, Health Information Foundation, Chicago, Ill. (Articles, dissertation; started 1964; EDC, 1966.)

Data for the research will be obtained from field studies of medical schools, hospitals, universities, pharmaceutical companies, industrial research and development firms, and Government agencies. The investigation will use extensive field work and surveys of professional researchers to obtain measures of organizational and psychological characteristics. Scientific output will be the dependent variable. In addition to intraorganizational evaluation, a panel of experts (physicians, biologists, chemists, etc.) will evaluate each organization's research projects on the basis of four criteria: (*1*) the importance of the problem studied, (*2*) how productive the research was, (*3*) how innovative the research was, and (*4*) the overall significance of the findings.

GROSS, EDWARD. **Scientists and Other Professionals in Organizations.** University of Minnesota, School of Business Administration, Industrial Relations Center, Minneapolis, Minn. (Monograph; started 1962; EDC, 1965.)

This study examines authority and status problems faced by scientists and other professionals in business organizations of several sizes. A completed interviewing phase is being analyzed and a systematic probe of certain special issues by use of a questionnaire survey is planned.

HAGSTROM, WARREN O. **The Scientific Community: A Sociological Analysis.** University of Wisconsin, Department of Sociology, Madison, Wis. (Book; started 1960; EDC, 1964.)

This study of informal relations between colleagues in the natural sciences is conducted primarily through unstructed interviews with some 90 scientists in west coast universities. It centers on the influence of colleagues, through professional recognition, on the decisions of scientists to select problems, select techniques, publish findings, and accept theories. The general approach leads to a description of characteristic strains in the scientific community: (*1*) competition for priority, (*2*) enlisting the assistance of formally independent colleagues, (*3*) inability to achieve recognition, (*4*) goal conflict in disciplines and the differentiation of disciplines, and (*5*) substantive disputes in science.

HIESTAND, DALE L. **Research on Manpower for the Health Services.** Columbia University, Graduate School of Business, New York, N.Y. (Article; started 1964; EDC, 1966.)

This critique of the research into quantitative and qualitative aspects of manpower for the health services will include suggestions for the direction of new or further research. The study will also consider the implications of new developments in this research field.

HOLSTEIN, EDWIN J., *see* PARSEGIAN, V. LAWRENCE, *et al.*

HOROWITZ, IRA. **The Economic Effects of the Distribution of Scientific Talent.** Indiana University, Graduate School of Business, Department of Quantitative Business Analysis, Bloomington, Ind. (Article; started 1964; EDC, 1964.)

The article is concerned with the development of an econometric model to analyze the impact, by region, of the distribution of scientific talent in Indiana.

———. **Regional Distribution of Scientific People.** University of California, Institute of Business and Economic Research, Berkeley, Calif. (Paper; started 1963; EDC, 1964.)

This study attempts to determine whether or not there is a tendency toward the development of scientific "pockets" in the United States and to identify factors which might account for their development. Economic impacts of the distribution of scientific talent are also being studied. The method of investigation applies econometric techniques.

HUNERYAGER, S. G. Preliminary Study of Organizational Role Expectations of Leaders (Managers) and Subordinates in Engineering Research Task Groups. Creighton University, Omaha, Neb. (Articles, papers; started 1963; EDC, 1964.)

This study will determine the expectations of scientific and engineering personnel toward their leader-manager and his behavior toward them. The feasibility of establishing some standard leadership profiles as they relate to research personnel is explored.

INTRILIGATOR, MICHAEL D. Allocating New Scientists Between Research and Teaching. University of California, Department of Economics, Los Angeles, Calif. (Article; started 1964; EDC, 1965.)

The allocation of new scientists between research and teaching, as measured by the proportion of new scientists entering the teaching profession, is considered from the viewpoint of an analytical model. The proportions allocated will be decided by time paths based on alternative policy objectives, including minimum time to attain a given research-teaching capability and maximum present value of research and teaching. Policy implications of these time paths are discussed with a view to clarifying socially desirable allocations of scientific effort.

JACOBSEN, TONY L., *see* PRICE, PHILLIP B., *et al.*

KRULEE, GILBERT K. Studies of Student Values, Curriculum Choice, and Educational Consequences. Northwestern University, Technological Institute, Department of Industrial Engineering, Evanston, Ill. (Papers; started 1958.)

Questionnaires have been administered to groups of freshmen and seniors at two schools of engineering. The questions under study are: (*1*) What are the backgrounds and values of students in different curricula, (*2*) what are some key determinants of student creativity while in college, and (*3*) what changes take place in students as a result of their undergraduate education? Emphasis is on students in science and engineering, but some comparisons will be undertaken with students in the liberal arts. In addition, samples of male students in three colleges—liberal arts, business, and engineering are being interviewed. The purpose of these interviews is to study relationships between a student's self-image, his academic success, and his occupational commitments.

LAUMANN, EDWARD O., *see* RAPOPORT AND LAUMANN.

LAUMANN, EDWARD O., *see* RAPOPORT, ROBERT N., *et al.*

LAWSON, KENT D., *see* **PARSEGIAN, V. LAWRENCE.**, *et al.*

LEBOLD, WILLIAM K., *see* **PERRUCCI AND LEBOLD.**

MARCSON, SIMON. The Scientist in Government. Rutgers, The State University, Department of Science and Technology Research, Bureau of Economic Research, New Brunswick, N.J. (Book; started 1964; EDC, 1965.)

This is a study of the organization and administration of research in government and of the functions of scientists within a civil service framework. The study is being carried out by means of detailed interviews and questionnaires.

———. **The University Scientist.** Rutgers, The State University, Department of Sociology, New Brunswick, N.J. (Book; started 1960; EDC, 1964.)

This is a study of the functioning of the scientist within the framework of a university organization. The structure of university research laboratories and departments and their management will be analyzed.

MARGULIES, NEWTON, *see* **SHEPARD AND MARGULIES.**

MCILVAINE, WILLIAM D., L. M. K. BOELTER, AND EDWARD P. COLEMAN. Examination and Analysis of the Educational Needs of Professional Technical Employees. California State College at Long Beach, Division of Engineering, Long Beach, Calif. (Papers; started 1962; EDC, 1964.)

This is a study of professional employees in technical enterprises, with emphasis on engineers. Analysis of the responses to questionnaires will help identify persons continuing educational programs in engineering science, communications skills, business, and cultural subjects that are most needed to improve the vitality of American enterprise. It is also believed that the analysis will be significant for educators planning formal full-time college programs for the future.

MENZEL, HERBERT AND ROLF MEYERSOHN. Physicians' Information. Columbia University, Bureau of Applied Social Research, New York, N.Y. (Report, articles; started 1964; EDC, 1965.)

This is a study of the level of knowledge of the practicing physician with regard to selected new developments in medicine. Major areas of investigation are: (*1*) the professional milieu in which the physician works and his integration into that milieu; (*2*) contacts with colleagues, reading habits, attendance at meetings, and participation in continuing medical education; and (*3*) training and type of practice. Interviews will be conducted with 800 general practitioners and internists in a variety of communities in the Eastern and East North Central States.

MENZEL, HERBERT AND JULIAN NIXON. **Chemists' Information: Formal and Informal Satisfaction of Information Requirements of Scientists.** Columbia University, Bureau of Applied Social Research, New York, N.Y. (Report, articles; started 1964; EDC, 1965.)

Two hundred polymer chemists, working in different settings, have been interviewed concerning specific "information receiving" episodes which serve several different functions in their work. The study considers hypotheses that different sets of communication channels and facilities will play a role in the service of these functions and that the interplay of formal and informal channels is affected by characteristics of the institutional setting.

MEYERSOHN, ROLF, *see* MENZEL AND MEYERSOHN.

NEUHAUSER, DUNCAN, *see* GORDON AND NEUHAUSER.

NIXON, JULIAN, *see* MENZEL AND NIXON.

NORGREN, PAUL H. AND AARON W. WARNER. **Pilot Study of Obsolescence of Scientific and Engineering Skills.** Columbia University, Seminar on Technology and Social Change, New York, N.Y. (Report; started 1964; EDC, 1966.)

The principal objectives of the project are: (*1*) to determine the problems of identifying the process of skill obsolescence among scientists and engineers in approximately 40 selected employing organizations, identify the areas which need investigation, and develop pilot techniques for assessing the extent and nature of the problem and (*2*) to probe into methods that may be used to obtain information concerning the staffing and operational problems which skill obsolescence poses for research and engineering managers. Information bearing on the problem of technical skill obsolescence will be obtained primarily through depth interviews with engineering managers, research directors, practicing engineers and scientists employed in the organizations studied, and engineers laid off by some of these organizations as a result of curtailments in military procurement programs.

ODIORNE, GEORGE S. **Campus Recruiting of Engineers.** The University of Michigan, School of Business Administration, Bureau of Industrial Relations, Ann Arbor, Mich. (Book, article; started 1961; EDC, 1964.)

This study includes the interviewing of graduating engineers and company recruiters, an analysis of college recruiting literature, and an investigation of company recruiting strategy and planning.

PARSEGIAN, V. LAWRENCE, MAURICE B. BAYLY, RICHARD L. CARTER, GEORGE GOE, EDWIN J. HOLSTEIN, AND KENT D. LAWSON. **Development of a New Approach to the Teaching of Science Courses for Liberal Education.** Rensselaer Polytechnic Institute, Interdepartmental Studies, Troy, N.Y., and Bennington College, Bennington, Vt. (Lawson). (Articles, course content; started 1964; EDC, 1967.)

The project will seek to develop new approaches to the teaching of science to students of liberal arts, business, law, government, psychology, theology, etc. A group of educators, representing many disciplines and colleges, will identify key phenomena, science-related characteristics, and conceptual bases and methodologies of the physical and sociological sciences and professions. This will be followed by selection of topics, approaches, and laboratory experiments for the new courses. Emphasis will be on the relatedness and transitional aspects of phenomena and disciplines, on concepts and methodology, and on philosophical and sociological implications.

PELZ, DONALD AND FRANK M. ANDREWS. **Stimulating and Inhibiting Factors in Scientific Performance.** The University of Michigan, Institute for Social Research, Survey Research Center, Ann Arbor, Mich. (Book, articles; started 1958; EDC, 1964.)

The general objective is to identify and measure certain factors contributing to, or detracting from, a stimulating research atmosphere. Data have been collected from over 1,300 scientists and engineers in 7 university departments, 5 industrial laboratories, and 5 governmental laboratories. Questionnaires were used to measure a variety of motivations which scientists may have concerning their work and the kinds of working relations they maintain with colleagues and chiefs. No information was obtained concerning attitudes toward personnel policies or conditions of work. Measures of technical performance were based on publications and patents and on evaluations of performance made by qualified colleagues, both supervisory and nonsupervisory.

The analysis: (*1*) develops from 230 questionnaire items a limited number of measures of motivations and interpersonal relations and (*2*) determines through statistical analysis how these measures are related to the technical performance of individuals.

PERRUCCI, ROBERT AND WILLIAM K. LEBOLD. **The Engineer in Industry and Government.** Purdue University, Department of Sociology, Lafayette, Ind. (Book, papers; started 1963; EDC, 1966.)

This is an examination of social backgrounds, education, work experiences, leisure activities, and opinions of engineers in industry and government. Major foci will be on adaptations to obsolescence and interplay between professional activities and organizational demands. A sample of 150 organizations will be stratified by size and by Standard Industrial Classification categories, from which 4,000 engineers will be subsampled.

PERRUCCI, ROBERT, *see* GERSTL AND PERRUCCI.

PRICE, PHILLIP B., CALVIN W. TAYLOR, AND TONY L. JACOBSEN. Predictors of Physician Performance. University of Utah, College of Medicine, Salt Lake City, Utah. (Articles, papers; started 1963; EDC, 1964.)

The research primarily concerns developing and evaluating predictors of physician performance based on the criterion measures of an earlier study. The project has two major objectives: (*1*) to determine to what degree premedical and medical school grades predict the performance criteria obtained and (*2*) to explore characteristics that are not currently emphasized in medical education and which may be important in successful performance as a physician.

RAPOPORT, ROBERT N. AND EDWARD O. LAUMANN. Middle Range Technologists' Careers: A Study of the Career Patterns of "Ten Year Outs" in Three Universities. Boston College, Institute of Human Sciences, Chestnut Hill, Mass. and The University of Michigan, Department of Sociology, Ann Arbor, Mich. (Laumann). (Articles, book chapter; started 1964; EDC, 1964.)

This is a survey of the career patterns of 1954 graduates of Massachusetts Institute of Technology, Rensselaer Polytechnic Institute, and Northeastern University. Graduates in three fields of engineering and two fields of physical science were sent questionnaires requesting information on their backgrounds, career patterns, and social life. The responses were analyzed to seek interrelations between factors in the social background and current social environment that were related to career development patterns. Four major sets of variables—early social environmental factors, university experiences, marital patterns and community life, and whether the individuals chose jobs that were heavily supported by Federal research funds—were analyzed in relation to current positions, incomes, and satisfactions.

RAPOPORT, ROBERT N., EDWARD O. LAUMANN, AND THEODORE FERDINAND. The Power of Choice: Career Orientations of Seniors in Two Technical Universities, Class of 1964. Boston College, Institute of Human Sciences, Chestnut Hill, Mass. (Rapoport); The University of Michigan, Department of Sociology, Ann Arbor, Mich. (Laumann); and Northeastern University, Department of Sociology, Boston, Mass. (Ferdinand). (Article, book chapter; started 1964; EDC, 1964.)

Seniors from the class of 1964 at two technical universities in the Boston area were mailed questionnaires asking for information about their career aspirations, particularly in reference to their attitudes toward government employment and their interest in aerospace efforts. From the response, a sample was drawn of individual with high, medium, and low academic performance as indicated by cumulative grade point averages. For each of these performance categories, an analysis is being made of types of career orientations associated with background experiences of various kinds and with marital status and marriage plans at the time of graduation.

RATH, GUSTAVE J., *see* **RUBENSTEIN AND RATH.**

ROSENSTEIN, ALLEN B., *see* **BOELTER AND ROSENSTEIN.**

RUBENSTEIN ALBERT H. AND GUSTAVE J. RATH. Researchers' Needs for Information. Northwestern University, Technological Institute, Department of Industrial Engineering and Management Sciences, Evanston, Ill. (Articles; started 1964; EDC, 1970.)

This project will analyze the actual needs of R&D people for technical information and will consider timing, form of information required, and the adequacy of existing information systems to meet these needs. Preliminary designs for a major study have been completed and involve a "field-experimental" approach in which researchers in several scientific specialties will be studied in relation to their day-to-day information requirements. A series of simulations, ranging from very simple, completely human-linked systems to complex, man-machine systems is being considered. Field experiments and simulations will help to test the usefulness of a variety of new and existing information services.

SCHEIN, EDGAR H. Career Development of Researchers. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1962.)

The purpose of this project is to develop basic information about the career patterns of scientists, engineers, and research administrators. It will focus on factors which enable scientific personnel to maintain effectiveness, creativity, and growth by interviews and questionnaires in government and industrial laboratories. A scale is also being developed to measure career orientations.

SCHILL, WILLIAM J. Study To Define Curricula Content for Technical Education. University of Illinois, School of Education, Vocational-Technical Department, Urbana, Ill. (Report; started 1963; EDC, 1964.)

This is a study to establish curricula content common to the preparation of technicians in various technical occupations. Personal interview, supervisor interview, and technician response to a Q-sort instrument will be used, and job success will be related to antecedent data of personal and social characteristics.

SHEPARD, HERBERT A. AND NEWTON MARGULIES. Educational Programs Designed To Correct Obsolescence of Scientific and Engineering Knowledge. Case Institute of Technology, Organizational Behavior Group, Cleveland, Ohio. (Started 1964; EDC, 1966.)

This study of 12 to 18 continuing education programs for scientists and engineers will evaluate program effectiveness from the viewpoint of the employer and individual employee.

TAYLOR, CALVIN W., *see* **PRICE, PHILLIP B.**, *et al.*

TAYLOR, M. LEE. Study of Two Agribusiness Careers. Louisiana State University and Agricultural and Mechanical College, Department of Sociology, Baton Rouge, La. (Book; started 1963; EDC, 1965.)

This is a sociological study of two groups of research chemists in the U.S. Department of Agriculture regional laboratory in New Orleans.

THORSON, THOMAS L. and collaborators. Science and Culture Change. University of Wisconsin, Interdepartmental Studies, Madison, Wis. (Seminar; started 1964; EDC, 1965.)

Faculty members of various departments will present papers on the subject of science and cultural change from their individual research. The departments to be represented in this ad hoc faculty seminar will include those of meteorology, art history, speech-drama, physics, anthropology, civil engineering, oncology, political science, and history of science.

TOLLEFSON, JOHN O. An Approach to Defense-Aerospace Marketing and Market Planning. Tulane University of Louisiana, School of Business Administration, Department of Marketing, New Orleans, La. (Dissertation; started 1962; EDC, 1965.)

This study concerns the problems of allocating highly talented manpower to study technical and mission performance characteristics of prospective hardware systems and of selecting systems which will be developed by the defense aerospace contractor. The problems are defined from information drawn from: (*1*) field studies within contractor organizations and (*2*) prior studies of contractor and government behavior and decision-making. Concepts and techniques from the areas of economic theory and operations research will be used.

UYEKI, EUGENE S., *see* CLIFFE AND UYEKI.

WARNER, AARON W., *see* NORGREN AND WARNER.

WILENSKY, HAROLD L. Work, Careers, and Leisure Style: Study of Sources of Social Integration. University of California, Department of Sociology, Berkeley, Calif. (Book, articles; started 1958; EDC, 1964.)

The aim of the study is to link specific attributes of work situations and careers to styles of leisure and to variations in the strength and kinds of ties binding persons and groups to community and society. Detailed interviews have been conducted with 1,354 men. Part of the study is directed toward R&D engineers.

For other projects pertaining to

SCIENTIFIC AND ENGINEERING MANPOWER, PERFORMANCE, EDUCATION, AND CREATIVITY

see:

Alker, Hayword R., Jr. and Ronald Brunner. Relations Among Scientific, Political, and Economic Development — Section 2

DeWitt, Nicholas. Research and Development in the U.S.S.R. — Section 4

Filley, Alan C. and Robert J. House. Some Organizational Correlates of Managerial Behavior — Section 5

Fox, Renée C. Study of Congolese Graduate Physicians — Section 4

Gates, James E. The Management of Creativity — Section 5

Glasson, John E. Federal Policy Organization for Science, 1957–62: The Congressional Position and Role — Section 6

Gordon, Gerald, *et al.* Organizational Setting and Scientific Accomplishment — Section 5

Gruber, William H. The Impact of Technological Change on the Economy — Section 2

Hays, Jo N. Methods of Scientific Popularization in Early Nineteenth Century Britain — Section 3

Kit, Boris. Current Inventory, Development, and Future Planning for Scientific and Technical Manpower Resources in the Field of Space Sciences and Technology in the U.S.S.R.: A Pilot Project — Section 4

Marcson, Simon. The Engineering Manager — Section 5

Merton, Robert K. Behavior of Scientists: Studies in the Sociology of Science — Section 3

Mullins, Nicholas C. Paradigms and Collegia in the Biochemical Sciences: A Study of the Structure and Functioning of Specialty Groups in Science — Section 9

Phillips, Walter. Educational Systems and the Supply of Scientists and Engineers in Four Countries — Section 4

Phipps, Lloyd J., *et al.* Technical Education in and for Rural Areas — Section 1

Pilisuk, Marc. Psychological Commitment to Roles in a Defense-Oriented Social System — Section 9

Price, Derek J. de Solla. Historical and Statistical Studies of Science, Technology, and Medicine — Section 3

Pundeff, Marin V. Science and Engineering Manpower Resources in Eastern Europe — Section 4

Pursell, Carroll W., Jr. Science and Government in the Great Depression, 1929–39 — Section 6

Rice, Philip M. History of Engineers in the United States — Section 3

Roth, Sidney G. National Aeronautics and Space Administration and University Relations — Section 6

Rubenstein, Albert H., *et al.* Development of New Technical Skills — Section 5

Siegel, Irving H. Individual and Joint Invention — Section 11

Skolimowski, Henryk. The Language and Structure of Technology — Section 3

Storer, Norman W. Continuing Theoretical Analysis of the Social System of Science — Section 9

WEKERLE, ANTON. Evaluation of the Role of the Sino-Soviet Bloc Countries in the Development of Scientific and Engineering Manpower Resources of Other Countries ____ Section 4

WILSON, C. CARL, *et al.* Metalworking Research in United States, Japanese, and European Universities and Institutes ____ Section 7

ZUCKERMAN, HARRIET A. AND ROBERT K. MERTON. Patterns of Collaboration in Science: Studies in the Sociology of Science ____ Section 9

SECTION 9

Sociology and Psychology

BOWERS, RAYMOND V., ROBERT G. BROWN, CLIFTON D. BRYANT, AND JERRY L. MILLER. Impact of Technological Change on Careers in Large-Scale Organizations: A Basic Study in the Sociology of Occupations. University of Arizona, Department of Sociology, Tucson, Ariz. (Book, articles; started 1960.)

This is a continuing study of the impact of change on the careers of executives and professionals in industry, Government, and other large-scale organizations. Technological changes are defined in terms of social science as well as natural science developments and are considered independent variables. The dependent variables are the impacts on the careerists. Such intervening variables as inner and other direction, general reaction to change, and commitment to the organization are also being considered. Four thousand research schedules from samples of executive and professional personnel in twelve large-scale organizations are being processed both for publication and for promising leads for the next phase of the project.

BROWN, ROBERT G., *see* **BOWERS, RAYMOND V.,** *et al.*

BRYANT, CLIFTON D., *see* **BOWERS, RAYMOND V.,** *et al.*

BURK, MARGUERITE AND IRVING TALLMAN. A Comparison of Mobility Patterns in Rural and Urban Low-Income Areas. University of Minnesota, School of Home Economics, Department of Family Social Science, St. Paul, Minn. (Article; started 1964; EDC, 1965.)

The project will examine the effects of technological unemployment on mobility patterns and sources of resistance to relocation of rural and urban low-income families of northeastern Minnesota. These patterns will be compared with intergenerational low-income families in St. Paul, Minn. Interviews are being conducted in both areas with various segments of the population preliminary to preparing a formal research design.

Coe, Rodney M. and Albert F. Wessen. Acceptance of an Innovation. Washington University, Department of Sociology and Anthropology, St. Louis, Mo. (Article; started 1961; EDC, 1964.)

This project evaluates the acceptance of a technological innovation pertaining to medications in a general hospital. It is a before-and-after study of changes in attitudes of nursing personnel toward the innovation. Data are being collected by interviews and observations, with each subject as his own control.

De Grazia, Alfred, Social Invention. New York University, Department of Government, New York, N.Y. (Book; started 1959; EDC, 1966.)

An integrative theory of the dynamics of social and individual invention is being developed. The ultimate objective is to enlarge the sphere of control over rates, types, and processes of invention.

Franz, Verl R., *see* Lonergan, Wallace G., *et al.*

Griffin, Robert M., Jr., *see* Grigg and Griffin.

Grigg, Charles M. and Robert M. Griffin, Jr. The Impact of the Space Program on Community and Governmental Organization. Florida State University, Institute of Social Research, Tallahassee, Fla. (Reports, dissertation; started 1964; EDC, 1969.)

The project will involve construction of a sampling design of the seven-county Cape Kennedy area and establishment of a continuing process for estimating population. From these an analysis of the changes in the distribution, characteristics, and attributes of the population will be derived. The study also will include an intensive analysis of the structure of leadership in one of the counties.

Guest, Robert H. Socio-Technical Systems. Dartmouth College, Tuck School of Business Administration, Hanover, N.H. (Book, articles; started 1961; EDC, 1964.)

This is a study of six complex technical organizations to determine the degree to which interpersonal and structural stresses are reduced over a period of time as a result of improvements in technical workflow and of participation in planning of technological changes. The study will build on and modify earlier theories originated by Trist, Bamforth, and Emory in Great Britain. Interviews and recorded data will be used.

Hamilton, C. Horace and Selz C. Mayo. **Social and Economic Significance of Recent Population Trends in North Carolina.** North Carolina State of the University of North Carolina at Raleigh, Department of Rural Sociology, Raleigh, N.C. (Articles, papers, dissertations; started 1960; EDC, 1965.)

This project involves analysis of the U.S. Censuses of Population in regard to technological, social, and economic change. Special emphasis is being given to rural-urban migration; population projections by age, sex, and color; educational levels and enrollments in schools and colleges; and changes in the composition and characteristics of the labor force. The study also involves the collection and analysis of a field survey on off-farm migration.

Hatfield, Colby, *see* Lang, Gottfried O., *et al.*

Hoyt, Elizabeth E. **General Theory of Culture Change Among Underdeveloped Peoples Under the Impact of Modern Technology.** Iowa State University of Science and Technology, Department of Economics, Ames, Iowa. (Papers.)

This continuing study of the impact of modern technology on underdeveloped areas uses personal observation and the theories of others. A general framework has been developed to show interrelationships among factors and the relative importance of each in different types of situations.

Hoyt, Elizabeth E. and Eleanor M. Shepherd. **Economic-Cultural Adjustment of American Indians, With Special Reference to One Group of Tama, Iowa.** Iowa State University of Science and Technology, Department of Economics, Ames, Iowa. (Book; started 1959; EDC, 1964.)

This study involves an analysis of the community of the Tama Indian settlement, with special reference to the effects of economic-technological changes as they occur when Indian children leave school.

Lang, Martha B., *see* Lang, Gottfried O., *et al.*

Lang, Gottfried O., Martha B. Lang, Colby Hatfield, Andrew Maguire, and Mary R. Reed. **Social and Cultural Change in Sukumaland, Tanganyika.** The Catholic University of America, Department of Anthropology, Washington, D.C. (Monograph; started 1961; EDC, 1966.)

Primary emphasis in this project is on general social change stimulated by new agricultural technologies and systems of marketing through cooperatives. The effects of the introduction of cotton on agricultural technology, and of medical technology on the lives of the people will also be investigated as part of a larger study on the transformation of a value system. Participant observation and unstructured interviewing are used to obtain data. Some production records, as well as health records, will be collected as they become available.

LIEBOW, ELLIOT, *see* **TRUDEAU, JOHN,** ***et al.***

LIEBOW, HARRIET, *see* **TRUDEAU, JOHN,** ***et al.***

LONERGAN, WALLACE G., RICHARD RENCK, AND VERL R. FRANZ. Attitude Surveys for Patients and Hospital Personnel. University of Chicago, Industrial Relations Center, Chicago, Ill. (Attitude survey forms; started 1961; EDC, 1964.)

One phase of the research will be to measure the impact of organizational and technological changes on patient and employee attitudes. Cross section and longitudinal methods will be used.

MAGUIRE, ANDREW, *see* **LANG, GOTTFRIED O.,** ***et al.***

MAYO, SELZ C., *see* **HAMILTON AND MAYO.**

MEEHAN, EUGENE J. Science and Social Values. Rutgers, The State University, Department of Political Science, New Brunswick, N.J. (Book; started 1955; EDC, 1965.)

This study will attempt to state the major problems of social values in terms compatible with modern science and will suggest the limits within which they can be considered.

MERTON, ROBERT K., *see* **ZUCKERMAN AND MERTON.**

MILJUS, R. C., F. A. ZELLER, and collaborators. Factors in Successful Labor Market Adaptations: Implications for Training and Retraining. The Ohio State University, College of Commerce and Administration, Columbus, Ohio. (Book, articles.)

The purpose of the study is to identify social, economic, psychological, and environmental variables that influence the success of worker adaptation to structural changes in the labor market. Questionnaires, tests, and depth interviews will be used to secure such information from samples of employed and unemployed workers and from their relatives, friends, and associates.

The second phase of the project will involve: (*1*) development of a comprehensive pilot program for training and rehabilitation based on findings from the preceding investigation, and (*2*) testing of this program to assess its value in enhancing worker adaptation to labor market changes.

MILLER, JERRY L., *see* **BOWERS, RAYMOND V.,** ***et al.***

MULLINS, NICHOLAS C. Paradigms and Collegia in the Biochemical Sciences: A Study of the Structure and Functioning of Specialty Groups in Science. Harvard University, Graduate School of Arts and Sciences, Department of Social Relations, Cambridge, Mass. (Dissertation, articles; started 1964; EDC, 1966.)

The basic content of the research involves the relationship between similarity of description and assumption on one hand and social relationships centered around scientific interests on the other. Growth and development of such social relationships and their connection with the development of content areas and assumptions of scientists will also be investigated. The study will be conducted through interviews with researchers sharing common problems of current research.

PECK, SIDNEY M. The Terminal Worker: A Study in Occupational Uprootedness. Western Reserve University, Department of Sociology, Cleveland, Ohio. (Book; started 1964; EDC, 1967.)

The project is a study of three plant closedowns in the Cleveland industrial area which involved termination of jobs for high-seniority workers in forge shop, oil refinery, and metal fabricating settings. Matched groups of workers will be selected for intensive case interviewing to study the social-psychological consequences of occupational dislocation. Theories on dislocation relating to psychiatric disorder and political extremism will be subjected to test. The use of life history materials and scaling techniques will augment the development of a longitudinal case study covering a 2- to 3-year span.

PERRY, STEWART E. Science, Psychiatry, and the American Society: A Study in the Social Integration and Insulation of Scientific Ideas. University of California, San Francisco Medical Center, School of Nursing, San Francisco, Calif. (Book, articles; started 1963; EDC, 1965.)

This is primarily an analysis of psychiatric scientific thinking since 1930 and its relation to the contemporary social and cultural structure of the United States. The study will be conducted through examination of published materials and by occasional interviews with psychiatric researchers. It will also examine scientific problems posed by the social organization of psychiatric research and revealed in close observational studies of actual projects.

PHILLIPS, BERNARD S. Strategy and Tactics of Social Research. Boston University, Graduate School, Boston, Mass. (Book; started 1964; EDC, 1966.)

The work constitutes a broad treatment of the philosophy of social science, research strategy and tactics, and relationships between theory and method. It includes an analysis of the effects of the existence of "two cultures" on both the progress of sociology and the effective application of the results of scientific knowledge. Strategies for achieving more effective two-way communication are to be discussed.

Pilisuk, Marc. Psychological Commitment to Roles in a Defense-Oriented Social System. The University of Michigan, Mental Health Research Institute, Ann Arbor, Mich. (Articles; started 1962.)

The research will investigate the phychological and economic adaptability of persons serving specialized needs for national defense. Questionnaires have been sent to military officers and industrial agencies that handle contract research. Library research regarding interlocking holdings among defense contracting firms will also be conducted.

Reed, Mary R., *see* **Lang, Gottfried O.,** ***et al.***

Renck, Richard, *see* **Lonergan, Wallace G.,** ***et al.***

Rosen, Ned A., *see* **Williams and Rosen.**

Shepherd, Eleanor M., *see* **Hoyt and Shepherd.**

Sizer, Leonard M. The Social and Economic Consequences of Changes in Employment Upon Selected Communities. West Virginia University, College of Agriculture, Department of Sociology, Morgantown, W. Va. (Bulletin; started 1964; EDC, 1968.)

This project will study the consequences of changes in employment on the social and economic organization of Ravenswood and Welch, W. Va. It will analyze data reflecting changes in education, employment, land use, etc., drawing on resources of State and private agencies. Other subjects to be investigated are (*1*) shifts in employment opportunities directly relating to major employment sources and the services contingent upon these shifts and (*2*) the pattern of employment opportunity as it relates to previous resident population and commuting patterns.

Stocking, George W., Jr. Race and Culture in American Social Science. University of California, Department of History, Berkeley, Calif. (Book; started 1959; EDC, 1965.)

This is a study of the emergence of modern social scientific thinking on race. It will also have considerable direct and indirect bearing on the social implications of science.

STORER, NORMAN W. **Continued Theoretical Analysis of the Social System of Science.** Harvard University, Department of Social Relations, Cambridge, Mass. (Books, articles, papers; started 1959.)

This study analyzes science as a social system. It will draw upon empirical data and a general theory of social systems, emphasizing creativity and its relation to science and society.

TALLMAN, IRVING, *see* BURK AND TALLMAN.

TRUDEAU, JOHN, ELLIOT LIEBOW, AND HARRIET LIEBOW. **Culture Change Among the Cree Indians of Winisk, Ontario, Canada.** The Catholic University of America, Department of Anthropology, Washington, D.C. (Articles; started 1958; EDC, 1964.)

This study concerns the influence of a Canadian radar base on 300 Swampee Cree Indians and how changes in employment patterns have brought about changes in their style of life. This is evidenced by the use of motor sleds for taxi purposes, visiting trap lines by airplane, and dependence on canned foods and on outboard motors. The methods of investigation included participant observation and camp-to-camp surveys.

WESSEN, ALBERT F., *see* COE AND WESSEN.

WILLIAMS, LAWRENCE K. AND NED A. ROSEN. **Training and Retraining: An Examination of Adult Learning.** Cornell University, School of Industrial and Labor Relations, Department of Organizational Behavior, Ithaca, N.Y. (Monograph; started 1963; EDC, 1965.)

The study will combine interviews and questionnaires in examining the attitudes and behavior of workers who were forced or who volunteered to engage in retraining. The principal focus, using social psychological factors present in the environment of the adult, has been on motivational constraints. Some of the more "classical" problems of learning have been investigated by on-site visits.

ZELLER, F. A., *see* MILJUS, R. C., *et al.*

ZUCKERMAN, HARRIET A. AND ROBERT K. MERTON. **Patterns of Collaboration in Science: Studies in the Sociology of Science.** Columbia University, Department of Sociology, New York, N. Y. (Dissertation; started 1962; EDC, 1964.)

This dissertation includes: (*1*) analysis of the patterns of social relations of scientific collaborators; (*2*) comparisons of growth rates of collaboration in the natural and social sciences for the past 50 years, using frequencies of individual and multiple authorship; (*3*) studies on the relative impact of

individual and collaborative work on the development of science, using citation indexes; (4) investigations of patterns of collaboration of eminent scientists, Nobel Laureates, and "men of science," using biographical and bibliographical sources; and (5) studies of the gratifications and strains of collaborative work, with data based on interviews with a sample of American Nobel Laureates and a match sample of non-Laureate scientists.

For other projects pertaining to
SOCIOLOGY AND PSYCHOLOGY
see:

ALPERT, HARRY. Sociology of Science ________ Section 6

BENNETT, JOHN W. Habitat, Institutions, and Economic Development in Saskatchewin: Studies in the Cultural Ecology of the Great Plains ________ Section 4

BERNSTEIN, IRVING, *et al.* The Changing Status of Skilled Workers in a Technologically Dynamic Industry ________ Section 12

BROWDER, GORDON. Technological Change and the Rural Farm Population of Montana ________ Section 1

CHARLTON, J. L. Analysis of the Social and Economic Effects of the Movement of Farm People ________ Section 1

CLARK, JOHN J. The New Economics of National Defense ________ Section 6

COHEN, ROBERT S. and collaborators. Studies in the Relation of the History of Science and the Philosophy of Science ________ Section 3

COUGHENOUR, CHARLES M., *et al.* Factors Affecting the Spread of Improved Farm Practices in Kentucky ________ Section 1

DEUTSCH, STEVEN E. Skill Level, Social Integration, and Ideology: A Study of Automobile Workers ________ Section 12

DONAT, EUGENE R. Information Technology and the Managerial Hierarchy ________ Section 13

ESTEP, SAMUEL D. Mass Media of Communications and Manipulation. The Mass Mind, With Emphasis on Space Communications Satellites Section 13

EVAN, WILLIAM M. Conflict and Performance in R&D Organizations ________ Section 8

FAUNCE, WILLIAM A. AND DONALD CLELLAND. Automation and the Industrial Community ________ Section 12

FILLEY, ALAN C. AND ROBERT J. HOUSE. Some Organizational Correlates of Managerial Behavior ________ Section 5

FOLTMAN, FELICIAN F. White Collar Redundancy ________ Section 12

FOX, RENÉE C. American Sociologist in the Land of Belgian Medical Research ________ Section 4

———. Study of Congolese Graduate Physicians ________ Section 4

GASMAN, DANIEL. Ernst Haeckel and the Acceptance of Darwinism in Germany ________ Section 3

GERSTL, JOEL E. AND ROBERT PERRUCCI. The Engineer and Society__ Section 8

GIBSON, WILLIAM L. AND HARRY M. LOVE. Tenure Adjustments in Farm Consolidation ________ Section 1

Glade, William P., Jr. The Latin American Economies: A Study of Their Institutional Evolution ... Section 4

Glaser, Barney G. The Changing Identity of American Scientists Section 8

——. The Underproductive Scientist ... Section 8

Gordon, Gerald, *et al.* Organizational Setting and Scientific Accomplishment ... Section 5

Hagan, Albert R. Family Farm Adjustments To Meet the Impact of Economic, Technological, and Sociological Change ... Section 1

Hagstrom, Warren O. The Scientific Community: A Sociological Analysis ... Section 8

Hardin, Einar. Economic and Social Implications of Automation: Volume III, Abstracts of Social Science Literature, 1961–64 ... Section 12

Heald, Morrell. Mass Production and Managerial Ideologies, or the Social Relations of Business Management ... Section 2

Hill, Robert E. Mechanized and Automated Society: A Paradigm Section 4

Huneryager, S. G. Preliminary Study of Organizational Role Expectations of Leaders (Managers) and Subordinates in Engineering Research Task Groups ... Section 8

Hyatt, Stephen, *et al.* Impact of a Space Facility on a Small Community: A Case Study of Andover, Maine ... Section 13

Ihnen, L. A., *et al.* An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions ... Section 1

Jacobs, Norman G. Underdevelopment Reconsidered: An Institutional-Sociological Case Study of Iran ... Section 10

Kranzberg, Melvin. Industrial Revolutions ... Section 3

——. Technology and the Idea of Mankind ... Section 3

Krulee, Gilbert K. Studies of Student Values, Curriculum Choice, and Educational Consequences ... Section 8

Kwok, Daniel Wynne-Ye. Scientism in Chinese Thought, 1900–1950 ... Section 3

Lionberger, Herbert F. and Rex R. Campbell. Social and Cultural Factors Affecting the Dissemination and Use of Scientific Farm Information by Missouri Farmers ... Section 1

Lonergan, Wallace G., *et al.* Marketing Managers' Responses to Automated Productivity ... Section 7

MacNaughton, John F., *et al.* An Investigation of the Social, Psychological, and Economic Impacts on the Workers Affected by the Humble Oil and Refining Company's Work-force Reduction at Baytown, Texas ... Section 12

Meier, Richard L. The Settlement of the Seas ... Section 10

Menzel, Herbert and Rolf Meyersohn. Physicians' Information Section 8

Merton, Robert K. Behavior of Scientists: Studies in the Sociology of Science ... Section 3

Mesthene, Emmanuel G. and colloborators. University Program on Technology and Society ... Section 2

Morris, W. H. M., *et al.*, Status and Rehabilitation of the Farm Cardiac ... Section 1

Moss, Leonard W. and Stephen C. Cappannari. Village Organization in South Italy ... Section 4

Nehnevajsa, Jiri and Richard H. Pomeroy. Impact of Civil Defense on Society ... Section 6

Orzack, Louis H. Social Implications of Automation ... Section 12

Pelz, Donald and Frank M. Andrews. Stimulating and Inhibiting Factors in Scientific Performance ... Section 8

Perrucci, Robert and William K. LeBold. The Engineer in Industry and Government ... Section 8

Price, Derek J. de Solla. Historical and Statistical Studies of Science, Technology, and Medicine Section 3

Rapoport, Robert N. and Edward O. Laumann. Middle Range Technologists' Careers: A Study of the Career Patterns of "Ten Year Outs" in Three Universities Section 8

Rapoport, Robert N., *et al.* The Power of Choice: Career Orientations of Seniors in Two Technical Universities, Class of 1964 Section 8

Raup, Philip M. Tenure Arrangements for Low-Equity Tenants Section 1

Rock, Vincent P., *et al.* Program of Policy Studies in Science and Technology Section 6

Rogers, Everett M., *et al.* Accelerating the Adoption of Agricultural Innovations Section 10

Savage, Charles H., Jr., and W. G. Bennis. Human and Organizational Consequences of Two Computer Installations in South America Section 4

Schill, William J. Study To Define Curricula Content for Technical Education Section 8

Sinclair, Robert O. Effects of Farm Consolidation and Abandonment on Rural Vermont Communities Section 1

Smock, Robert and James Simmons. Detroit Area Traffic Study Section 13

Sutherland, J. Gwyn and C. E. Bishop. An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions Section 1

Taylor, M. Lee. Study of Two Agribusiness Careers Section 8

Thorson, Thomas L. and collaborators. Science and Culture Change Section 8

Webber, Laurence E., *et al.* Methods of Evaluation of Cost of Air Pollution Section 6

Welles, John G. and Charles H. Prien. Oil Shale: Economic Implications of a New Industry Section 7

Wilensky, Harold L. Work, Careers, and Leisure Style: Study of Sources of Social Integration Section 8

Wilpuetz, Robert. Effects of Automation on Employee Morale and Productivity in a Bank: A Case Study Section 12

SECTION 10

Economic Development

BARANSON, JACK. Diesel Engine Manufacturing in Less Developed Countries. Indiana University, International Development Research Center, Bloomington, Ind. (Book; started 1964; EDC, 1965.)

The study will investigate economic conditions and related environments that affect engine design and the choice of production techniques. It will concentrate on plants built or planned for India, Mexico, and Brazil and will include an analysis of comparative production costs with plants located in the United States, United Kingdom, and Japan. Analysis will be done on a components and parts basis. The purpose of the study is to gain new insights into obstacles that stand in the way of industrialization and to draw some policy implications on the relationships between technology and economic development.

BENOIT, EMILE. International Economic Adjustments to Disarmament and Arms Control. Columbia University, Graduate School of Business, New York, N.Y. (Book; started 1962; EDC, 1965.)

One part of this project will seek answers to the following question: To what extent could physical and human resources released by disarmament or arms controls programs contribute to international economic development, both via an enlargement of the traditional program of capital export and technical assistance and through the formation of new specialized R&D programs aimed at the discovery and elimination of specific technological and social bottlenecks in the process of economic development?

BLAISE, HANS C., *see* **ESMAN AND BLAISE.**

CAPLOW, THEODORE AND KURT FINSTERBUSCH. Patterns of Economic and Social Development in the Modern World. Columbia University, Bureau of Applied Social Research, New York, N.Y. (Articles; started 1963; EDC, 1965.)

The study will examine, country by country, the interrelationship of demographic, economic, and welfare factors as complex functions of technical progress. This involves the accumulation of 35 to 45 current items of statistical information for every autonomous territory in the world with a population of 5 million or more, the intercorrelation of all these series, and the preparation of national development profiles.

Coddington, Dean C., *see* **Mahar, James F.**, *et al.*

Coyle, John J., *see* **Frey, John C.**, *et al.*

Dansereau, H. Kirk, *see* **Frey, John C.**, *et al.*

DeWitt, Nicholas and collaborators. **International Survey of Educational Development and Planning.** Indiana University, Department of Economics and Government, Bloomington, Ind. (Book, started 1964; EDC, 1968.)

This world survey of the relationship between educational development and national economic and political development will particularly emphasize the economics of education and planning. Special attention will be given to the role of scientific-technical personnel and professional manpower in economic development.

Dillon, Robert L., W. N. Peach, Richard W. Poole, and Lee B. Zink. Aerospace Technology Applications. Southeastern State College, Department of Economics, Durant, Okla. (Dillon and Zink); University of Oklahoma, Department of Economics, Norman, Okla. (Peach); and Oklahoma State University of Agriculture, Department of Economics, Stillwater, Okla. (Poole). (Papers; started 1964.)

This project is concerned with new knowledge which has resulted from space programs and devising ways of accelerating its application to commercial and consumer purposes in areas that are not highly urbanized. Methods of investigation include the use of retrieval systems for technical materials and consultation with businessmen, farmers, professional men, and educators.

Esman, Milton J. and Hans C. Blaise. Inter-University Research Program in Institution Building. University of Pittsburgh, Graduate School of Public and International Affairs, Economic and Social Development Department, Pittsburgh, Pa. (Books, articles, monographs, dissertations; started 1963.)

Research will be conducted on the strategy of establishing and institutionalizing certain new or reconstituted organizations in developing countries. The focus will be on organizations which introduce new physical and social values, functions, and technologies.

Eyerly, Raymond W., *see* **Frey, John C.**, *et al.*

Finsterbusch, Kurt, *see* **Caplow and Finsterbusch.**

FREY, JOHN C., H. KIRK DANSEREAU, ROBERT D. PASHEK, JOHN J. COYLE, OWEN H. SAUERLENDER, AND RAYMOND W. EYERLY. The Impact of Highway Improvement on Land Use, Business Enterprise, and Community Development in Selected Areas of Pennsylvania. The Pennsylvania State University, Institute for Research on Land and Water Resources, University Park, Pa. (Started 1958.)

This continuing project views the developing highway system as a form of technological change and emphasizes social and economic impacts of highway development on the community and region. Major areas under investigation are: (*1*) prediction of economic growth associated with highway development, (*2*) land use planning for protection of highway facilities from obsolescence caused by unregulated growth, and (*3*) development of social conditions and community structures conducive to the regulation of roadside growth for highway protection. The method of investigation is by field surveys and the use of published sources.

HAMBERG, DANIEL. Sources of Economic Growth: A Study of the Relation Between Investment, Technological Change, and Economic Growth. State University of New York at Buffalo, School of Business Administration, Department of Economics, Buffalo, N.Y. (Book, articles; started 1962; EDC, 1967.)

The construction of theoretical models of economic growth, based on aggregate production functions, will be followed by the fitting of models to cross-section data for different countries and to time-series data for the United States. Least-squares multiple regression and correlation techniques will be used in the statistical analysis.

HERZOG, WILLIAM, *see* **ROGERS, EVERETT M.,** *et al.*

JACOBS, NORMAN G. Underdevelopment Reconsidered: An Institutional-Sociological Case Study of Iran. University of Kansas, Department of Sociology and Anthropology, Lawrence, Kans. (Book; started 1962; EDC, 1965.)

The prime thesis of this study concerns the inability of scientific innovation to stimulate development in some countries because of institutional factors. The first section of the project is a case study of Iran, and it will use the analytical-institutional-comparative-sociological approach. The second section will present an analytical model for development and will reconsider development theory and method in the light of the model and the case study.

LOWENSTEIN, MILTON D. Instead of the Professionalized City. Arizona State University, School of Architecture, Tempe, Ariz. (Book; started 1963; EDC, 1966.)

This project concerns preparation of programs for pioneer communities in some of the less inhabited frozen and arid areas of the earth which, with the aid of modern technology and science, could be made available to a larger number of settlers and future generations.

MAHAR, JAMES F., DEAN C. CODDINGTON, AND JOHN G. WELLES. **The Scientific Complex: Challenge to Colorado.** University of Denver, Denver Research Institute, Denver, Colo. (Report; started 1963; EDC, 1964.)

This is an investigation of the factors which have been responsible for the development of six scientific complexes in the United States. The study will compare the current status of these factors in Colorado and will recommend steps to be taken to accelerate the growth of Colorado's emerging scientific complex. Data will be gathered from field interviews and published sources.

MEIER, RICHARD L. **The Settlement of the Seas.** The University of Michigan, School of Natural Resources, Department of Conservation, Ann Arbor, Mich. (Papers; started 1963; EDC, 1966.)

Oceanographers in 1964 announced that they believed it was possible to establish human settlements on the high seas. An explanation of the geography, economics, technology, social organization, and politics of such settlements has been initiated. The purpose of this series of papers is to discover whether the pressure of population on resources would be reduced by such an innovation.

MURRY, DONALD. **Scientific Research in Missouri.** University of Missouri, School of Business and Public Administration, Research Center, Columbia, Mo. (Monograph; started 1962; EDC, 1965.)

This is a study of the role of research and development in Missouri's economy, including measures of the regional economic consequences of technological change, the determinants of regional R&D growth, analysis of intersector flows of funds for research and development, and an analysis of the expansion of scientific research in Missouri. The study employs existing data and field surveys.

PASHEK, ROBERT D., *see* FREY, JOHN C., *et al.*

PEACH, W. N., *see* DILLON, ROBERT L., *et al.*

POOLE, RICHARD W., *see* DILLON, ROBERT L., *et al.*

ROGERS, EVERETT M., GORDON WHITING, AND WILLIAM HERZOG. **Accelerating the Adoption of Agricultural Innovations.** Michigan State University of Agriculture and Applied Science, College of Agriculture, Department of Communication, East Lansing, Mich. (Books, articles, papers, dissertations; started 1964; EDC, 1968.)

Field investigations of the communication and adoption of new farm practices in three developing countries are being made. Areas of investigation include:

(*1*) study of the success or failure of programs of directed social change in 80-100 villages in each country, (*2*) personal interviews with all farm operators in 16 of these villages, and (*3*) field experiments over a period of time in these villages to test the effects of various communication variables which cause changes to occur. A documents center of studies on the diffusion of innovations is also being assembled.

RUBENSTEIN, ALBERT H. AND EARL C. YOUNG. **Organization of Applied Research in Smaller and Developing Countries.** Northwestern University, The Technological Institute, Department of Industrial Engineering, Evanston, Ill. (Papers; started 1962; EDC, 1964.)

The objective of the study is to describe the means used by developing countries to establish and maintain R&D capabilities. A number of alternative strategies, used or proposed for this purpose, are being analyzed in relation to the stated objectives for R&D in a number of these countries. Primary means of data collection have been through documentation, questionnaires, and local interviews. The first on-site field study was conducted in 1964 in Central America.

SAUERLENDER, OWEN H., *see* FREY, JOHN C., *et al.*

STRASSMAN, W. PAUL. **Factor Proportions, Technological Change, and Industrialization in Underdeveloped Countries.** Michigan State University of Agriculture and Applied Science, College of Business and Public Service, Department of Economics, East Lansing, Mich. (Book; started 1960; EDC, 1965.)

The study seeks to determine to what extent, and where, manufacturing processes have been adjusted to different labor-capital prices. The introduction of innovations in the countries to be studied (Mexico and Puerto Rico) will also be examined. The method of study includes interviews and visits to plants.

———. **Industrial Research Organization and the Transfer of Technology to Underdeveloped Countries.** Michigan State University of Agriculture and Applied Science, College of Business and Public Service, Department of Economics, East Lansing, Mich. (Book, articles; started 1964; EDC, 1968.)

The project will attempt to identify and explain the kinds of industrial research projects that can be successfully pursued by existing research organizations to develop new manufacturing techniques for underdeveloped countries. A sample of research organizations will be studied through their records about projects, personnel, and budgets. The work is to be supplemented by intensive interviews of research administrators and scientists in charge of specific projects in Europe, the United States, and overseas.

WELLES, JOHN G., *see* MAHAR, JAMES F., *et al.*

WHITING, GORDON, *see* ROGERS, EVERETT M., *et al.*

WIRTHLIN, RICHARD B. **The Influence of International Trade on Technological Change in the Economically Underdeveloped Nation.** Brigham Young University, College of Business, Department of Economics, Provo, Utah. (Article; started 1964.)

The article will compare the nature of technological change in developed and underdeveloped economies, with emphasis on the impact of international trade. The choice between adopting or initiating new technology, as faced by underdeveloped countries, will also be discussed. The study will incorporate development of an econometric model and a case study of the Brazilian economy.

YOUNG, EARL C., *see* RUBENSTEIN AND YOUNG.

ZINK, LEE B., *see* DILLON, ROBERT L., *et al.*

For other projects pertaining to

ECONOMIC DEVELOPMENT

see:

ALKER, HAYWORD R., JR. AND RONALD BRUNNER. **Relations Among Scientific, Political, and Economic Development** ______ Section 2

ARRINGTON, LEONARD J. AND GEORGE JENSEN. **The Impact of Defense Installations and Defense Manufacturing on the Economy of Utah** ______ Section 6

BACON, FRANK R., JR. **A Firm-Level Study of the Effect of Science and Technology on Economic Growth** ______ Section 2

BENNETT, JOHN W. **Habitat, Institutions, and Economic Development in Saskatchewan: Studies in the Cultural Ecology of the Great Plains** ______ Section 4

CHENG, TIEN-HSI. **A Critical Review of Developments in Biological Sciences in Mainland China** ______ Section 4

CHIHOTE, RONALD H. **The Spanish Iron and Steel Industry: The Role of Heavy Industry in a Developing Nation** ______ Section 4

CONKLIN, HOWARD E. **A Study of the Extent and Intensity of Farming in Eastern New York State** ______ Section 1

FORRESTER, JAY W. **Industrial Dynamics** ______ Section 5

GAMBLE, HAYS, B., *et al.* **Application of an Input-Output Model to "Microregional" Analysis** ______ Section 2

GLADE, WILLIAM P., JR. **The Latin American Economies: A Study of Their Institutional Evolution** ______ Section 4

HARRIS, L. JAMES AND IRVING H. SIEGEL. Role of Industrial and Intellectual Property in Latin America ———— Section 11

HATHAWAY, DALE E. Food, Economic Development, and International Relations ———— Section 4

LANG, GOTTFIED O., *et al.* Social and Cultural Change in Sukumaland, Tanganyika ———— Section 9

MCKINNEY, R. D., *et al.* Kansas Area Development ———— Section 1

MOSS, LEONARD W. AND STEPHEN C. CAPPANNARI. Village Organization in South Italy ———— Section 4

PHELPS, EDMUND S. AND CHARLOTTE D. PHELPS. A Comparative Study of Economic Growth ———— Section 2

SAVAGE, CHARLES H., JR., AND W. G. BENNIS. Human and Organizational Consequences of Two Computer Installations in South America — Section 4

SPENGLER, JOSEPH J. History of Economic Ideas in Asia, the Middle East, and Europe Before 1700 ———— Section 3

SECTION 11

Patents and Trademarks

BANGS, ROBERT B. AND JOHN F. CREED. Tax Problems Connected With Patents and Related Industrial Property. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Report, article; started 1956.)

A series of continuing studies is conducted in the identification and description of specific tax problems involving patents and other forms of intellectual property. Data are gathered through interviews with officials of corporations and by mail questionnaires sent to individual inventors and to corporations.

CREED, JOHN F., *see* **BANGS AND CREED.**

FEDERICO, P. J. Foreign Patent Statistics. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D. C. (Report, article; started 1960.)

This is a study of foreign patents to determine whether the statistics of patent applications and patents granted are generally comparable between countries.

HARRIS, L. JAMES AND IRVING H. SIEGEL. Positive Competition. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1959.)

Continuing inquiry will be made into the character of competition as it exists, rather than as it is described through norms or ideals, and its manifestations in various situations involving patents and other industrial property.

———. Role of Industrial and Intellectual Property in Latin America. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1962.)

This is a series of continuing studies on the role of industrial and intellectual property in Latin America and its contribution toward responsible economic development in that area with assistance from U.S. public and private sources.

HURT. ROBERT M. **An Intellectual History of the American Patent System, With Special Consideration for the Ideas of Property Rights.** Princeton University, Department of Economics, Princeton, N.J. (Dissertation; started 1963; EDC, 1965.)

This study, based on library research, will concentrate on court decisions, legal publications, and readings in legal philosophy.

MACHLUP, FRITZ and collaborators. **Economic Aspects of Patent Protection, Technological Inventions, and Their Development.** Princeton University, Department of Economics, Princeton, N.J. (Reports; started 1960.)

This research to provide factual data on the promotion of technological progress under the patent incentive will include information on the following: (*1*) the degree of use and nonuse of patented inventions, (*2*) the rate of obsolescence of inventions, (*3*) the relative frequency of various types of inventions, (*4*) the role of basic patents in particular industries, such as public utilities, (*5*) the international balance between patents granted to foreign nationals and patents acquired in foreign countries, and (*6*) the arguments concerning such subjects as the "optimum" duration of the patent grant.

MOSEL, JAMES N. **Standards for Determining Trademark Distinctiveness.** George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Report, article; started 1963.)

The project is designed to develop a standardized set of techniques for measuring the likelihood of trademark confusion and thus to provide an objective method for assessing trademark infringement when such an issue becomes a matter of litigation.

NEEDHAM, DOUGLAS. **The Effect of the Patent Incentive on Innovative and Inventive Activity.** Princeton University, Department of Economics, Princeton, N.J. (Dissertation; started 1962; EDC, 1965.)

A theoretical analysis of the effect of the patent incentive on innovative and inventive activity is being made, using the tools of modern economic theory to derive generalizations from plausible assumptions. A critical examination will also be made of empirical materials presented in connection with the Government investigation of the pharmaceutical industry.

ROSSMAN, JOSEPH. **Nature and Role of Invention and Inventors in Contemporary Society.** George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Report, article; started 1961.)

A series of continuing studies is being conducted on rewards and incentives to United States and foreign employee-inventors, specifically on the extent to which new ideas of U.S. and Foreign inventors are adopted by manufacturing companies.

Sanders, Barkev S. Sources, Uses, and Values of Patented Inventions. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1955.)

These continuing studies seek to determine the proportions of labor and capital going into patented inventions. The changing forces affecting the economic role and significance of invention will also be studied, along with the contribution of patented inventions to the economy. Both domestic and foreign sources will be tapped and cross-analyzed where possible.

Schmookler, Jacob. Determinants of Inventive Activity. University of Minnesota, Department of Economics, Minneapolis, Minn. (Book, articles; started 1956; EDC, 1964.)

Annual statistics of U.S. patents granted in several industries since 1837 are being compared with important inventions in four industries since 1800, with scientific discoveries, and with economic variables. Comparisons are made to some extent in terms of content, but largely in terms of graphic, statistical, and econometric analyses.

Siegel, Irving H. Analysis of Published Company Information on Research and Industrial Property. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1959.)

These continuing studies examine company patent, trademark, research, and related activities, as revealed in annual reports to stockholders, corporate technical publications, trade journals, congressional prints, Government documents, and other media.

———. Individual and Joint Invention. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1961.)

This is a continuing investigation and explanation of the statistical distribution of inventors per patent in large corporations and in various technologically progressive fields. Related statistics (e.g., on authors per technical article) and literary material bearing on roles of individuals and groups in creative achievement are also considered.

Siegel, Irving H. and Edgar Weinberg. Role of Patents in the Evolution of Established Firms. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1959.)

This is a continuing series of case studies on the role of patents and other factors in the diversification, merger, and continuity of existing firms.

SIEGEL, IRVING H. and collaborators. Role of Patents in the Creation, Development, and Operations of Small Industrial Firms. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Reports, articles; started 1955.)

This is a continuing series of industry case studies designed to illuminate the significance of patents, among other factors, in the origin, evolution, and activity of small firms.

SIEGEL, IRVING H., *see* HARRIS AND SIEGEL.

WEINBERG, EDGAR, *see* SIEGEL AND WEINBERG.

WEISER, GERARD J. Role of Industrial and Intellectual Property in the European Economic Community. George Washington University, Patent, Trademark, and Copyright Research Institute, Washington, D.C. (Articles; started 1961.)

The project concerns developments in the European Economic Community (Common Market) and their effects on American interests, both here and abroad. It emphasizes the impact on industrial, intellectual, and artistic property. The study is principally in legal and economic terms. The analysis and interpretation of developments are designed to bring out the challenges and opportunities the Common Market presents to American interests. Two principal fields are being investigated: industrial property and antitrust. Both the national and the EEC laws, court decisions, and administrative rulings are being studied. The relationship between national and supranational legislation is given special attention.

For other projects pertaining to

PATENTS AND TRADEMARKS

see:

MACHLUP, FRITZ AND ALEXANDER G. VICAS. **The Lag of Unrestricted Imitation Behind Product Innovation** .... Section 13

SECTION 12

Automation and Impacts on Labor

BELZUNG, LAURIE D., *see* **MACNAUGHTON, JOHN F.,** ***et al.***

BERNSTEIN, IRVING, PAUL PRASOW, AND PAUL SULTAN. The Changing Status of Skilled Workers in a Technologically Dynamic Industry. University of California, Institute of Industrial Relations, Los Angeles, Calif., and Claremont Graduate School and University Center, Claremont, Calif. (Sultan). (Book, monograph, articles; started 1964; EDC, 1966.)

The research will investigate the effects of automation on workers whose jobs undergo basic technological change resulting from the introduction of numerical control equipment, electronic computers, and instrumentation or automatic controls. Data will be gathered by structured interviews of worker, supervisor, union, and management personnel; direct observation of automated and nonautomated functions; and analysis of job descriptions, job evaluation systems, and personnel records. The study is based upon a representative sample of approximately 1,000 persons employed by a major industry in southern California.

CLELLAND, DONALD, *see* **FAUNCE AND CLELLAND.**

DEUTSCH, STEVEN E. Skill Level, Social Integration, and Ideology: A Study of Automobile Workers. Western Reserve University, Department of Sociology and Anthropology, Cleveland, Ohio. (Dissertation; EDC, 1964.)

This study attempts to examine the total impact that technology, through a review of job skills, has upon the worker. Factors investigated are: (*1*) relations with others in the plant, (*2*) involvement in work and job attitudes, (*3*) occupational aspirations and interests, (*4*) union involvement, (*5*) political attitudes and behavior, and (*6*) involvement in the neighborhood and community. The research is based on personal interviews conducted in 1962 with 306 American automobile workers.

EISENBERG, WALTER L. Migratory Farm Labor: A Federal Policy Alternative. The City University of New York, Hunter College, Department of Economics, New York, N.Y. (Article; started 1964; EDC, 1965.)

This is an analysis of public policy in the field of agricultural manpower utilization. It will emphasize seasonal migratory labor, implications of recent labor-displacing developments in agricultural technology, and formulation of Federal policy alternatives.

FAUNCE, WILLIAM A. AND DONALD CLELLAND. Automation and the Industrial Community. Michigan State University of Agriculture and Applied Science, Department of Sociology and Anthropology, East Lansing, Mich. (Articles; started 1961; EDC, 1964.)

This study analyzes the effects of automation on the occupational composition of the labor force in an industrial community and the effects of changes in occupational composition on various community institutions. Data are from interviews and historical records.

FOLTMAN, FELICAN F. Training and Retraining Problems Related to Automation. Cornell University, School of Industrial and Labor Relations, Department of Human Resources, Ithaca, N.Y. (Articles; started 1961; EDC, 1964.)

The study is designed to obtain data relating to training and retraining policies, programs, and problems of organizations in which automation has been introduced or is being planned. The method of study consists of personal interviews and the analysis of data provided by employing firms and trade unions.

———. White Collar Redundancy. Cornell University, School of Industrial and Labor Relations, Department of Organizational Behavior, Ithaca, N.Y. (Article; started 1964; EDC, 1965.)

This is a case study of the impact of technological displacement on 1,400 white-collar and blue-collar employees. It resulted from the September 1963 closure of a large unit in a basic industry in upstate New York and is especially concerned with the economic and social impact of unemployment on each of the two categories of employees, their mobility and job-seeking patterns after displacement, their subsequent ability or inability to find suitable employment, and the work conditions of those who found new employment in comparison with former jobs.

FRANKE, WALTER H. Long-Term Labor Force Adjustment and Sources of Income of Displaced Workers. University of Illinois, Institute of Labor and Industrial Relations, Urbana, Ill. (Article; started 1962.)

This is a followup survey of an earlier study of workers displaced from their jobs by the closing of five plants in the meat packing and home laundry equipment industries. The purpose of this resurvey is to determine long-run labor force adjustments made by these technologically displaced workers and to identify the sources of income of the long-term unemployed. The method of investigation will be by mail, telephone, and personal interview.

GITLOW, ABRAHAM L. **Technological Change, Union Structure, and the Appropriate Bargaining Unit.** New York University, School of Commerce, Department of Economics, New York, N.Y. (Article; started 1964; EDC, 1965.)

The project is an analysis of the impact of technological change on union structure in the United States, combined with an investigation of the influence of technological change on National Labor Relations Board determinations of the appropriate bargaining unit. Method of the study will be by a mail survey of national and international unions in the United States and a study of NLRB bargaining unit determinations.

HARDIN, EINAR. **Economic and Social Implications of Automation: Volume III, Abstracts of Social Science Literature, 1961–64.** Michigan State University of Agriculture and Applied Science, School of Labor and Industrial Relations, East Lansing, Mich. (Bulletin; started 1964; EDC, 1965.)

This is an analysis of social science research literature pertaining to automation which has been published in English during the period 1961-64. An abstract of each publication will be prepared and material classified according to subject matter. This résumé is a sequel to Volume I, by Gloria Cheek, which covers the literature before 1957, and to Volume II, by Hardin, Eddy, and Deutsch, covering literature from 1957-60.

———. **Economic Benefits and Costs of Retraining Programs for Unemployed Workers.** Michigan State University of Agriculture and Applied Science, School of Labor and Industrial Relations, East Lansing, Mich. (Monograph, articles; started 1963; EDC, 1966.)

An analysis of interview data and Government statistics will be made to determine differential rates of change for earnings of trainees and comparable nontrainees to assess the financial impact of the Manpower Development and Training Act and the Area Redevelopment Administration retraining programs on the individual, the output of the nation, and the Government budget.

HARMS, LOUIS T. AND ROSELLA JAMES. **Development of Labor-Force Employment and Unemployment Data for the 67 Counties of Pennsylvania.** Temple University, School of Business and Public Administration, Bureau of Economic and Business Research, Philadelphia, Pa. (Report; started 1962; EDC, 1964.)

Detailed data are being developed for the purpose of determining the impact of technical and other factors on the economic development of small areas in the State of Pennsylvania.

JAFFEE, ABRAM J. **Study of the Impact of Technological Change on the Total Labor Force.** Columbia University, Bureau of Applied Social Research, New York, N.Y. (Book; started 1962; EDC, 1964.)

The extent to which technological innovations affect the size, skill, and industrial composition of the labor force is being investigated. Innovations which are laborsaving and those which make new products possible will be examined. Indices of labor productivity and amounts of investment in various industries will be examined to determine the relationship to employment and labor force composition over the past two decades in the United States. The basic data on the labor force are the occupational and industrial statistics provided by the U.S. decennial censuses of population. Accordingly, an attempt is being made to cover all industries and provide a broad picture of changes and related factors, rather than detailed analyses of a few selected industries. However, special attention will be paid to the impact of computers and other office machinery on the white-collar labor force.

JAMES, ROSELLA, *see* HARMS AND JAMES.

KILLINGSWORTH, CHARLES C. **Structural Changes in the Economy and Employment.** Michigan State University of Agriculture and Applied Science, School of Labor and Industrial Relations, East Lansing, Mich. (Articles; started 1958.)

This study analyzes the employment effects of automation, concentrating on the relationships between automation, educational attainment, employment, and unemployment.

MACNAUGHTON, JOHN F., JOHN P. OWEN, AND LAURIE D. BELZUNG. **An Investigation of the Social, Psychological, and Economic Impacts on the Workers Affected by the Humble Oil and Refining Company's Work-force Reduction at Baytown, Texas.** University of Houston, College of Business Administration, Department of Economics and Finance, Houston, Tex. (Monograph; started 1963; EDC, 1965.)

The study involves the Humble Oil and Refining Company's Baytown refinery work-force reduction in 1962 of 722 employees from a total labor force of 4,445 persons. It will cover (*1*) an analysis of the economic forces which resulted in the employee reduction; (*2*) an examination and measurement of the social, psychological, and economic effects of a major work-force reduction on the workers concerned; and (*3*) a series of recommendations which can be helpful in implementing any future large-scale labor reduction of this type. Information was obtained primarily from company records and extensive personal interviews with a large sample of terminated employees.

MILLER, J. JAMES. Automation: Job Creation and Unemployment. Duquesne University, School of Business Administration, Department of Management, Pittsburgh, Pa. (Article; started 1963; EDC, 1964.)

This is an evaluation of the impact of automation on job opportunity and unemployment. It will make a historical comparison of the impact of mechanization against the current impact of automation. Library research and personal observations will be employed as the methods of investigation.

ORZACK, LOUIS H. Social Implications of Automation. Boston University, Department of Sociology and Anthropology, Boston, Mass. (Paper; started 1963; EDC, 1964.)

The paper is an analytical review of empirical information on the introduction of automative processes in industry and their impact on social systems of immediate work settings, work and colleague groups, and the surrounding community.

OWEN, JOHN P., *see* MACNAUGHTON, JOHN F., *et al.*

PRASOW, PAUL, *see* BERNSTEIN, IRVING, *et al.*

SELTZER, GEORGE. Manpower Assessment of the Iron Ore Industry. University of Minnesota, School of Business Administration, Department of Industrial Relations, Minneapolis, Minn. (Articles; started 1964; EDC, 1965.)

The project concerns quantitative and qualitative manpower balance emphasizing projected requirements to 1975. It will take into account productivity and technological changes and give attention to the implications for employment and training.

SIMON, KENNETH M., *see* VAN DE WATER AND SIMON.

SULTAN, PAUL, *see* BERNSTEIN, IRVING, *et al.*

TRIPP, L. REED. Automation and White-Collar Job Trends in the Lehigh Valley Labor Market. Lehigh University, College of Business Administration, Department of Economics, Bethlehem, Pa. (Monograph; started 1964; EDC, 1965.)

This is a survey of changes in office occupational requirements of employers of white-collar workers in Allentown, Bethlehem, and Easton, Pa., in both automating and nonautomating firms. Attention will also be given to alternative methods and procedures of occupational manpower budgeting.

VAN DE WATER, JOHN R. AND KENNETH M. SIMON. **Legal and Managerial Control of Work Restrictions in Industry.** University of California, School of Business Administration, Los Angeles, Calif. (Article; started 1962; EDC, 1964.)

This is a study of featherbedding and its cost in American industry, arising in part from technological change. A reevaluation will be made of public and private programs which aim to deal with problems of retraining and job security while seeking to accelerate the pace of technological change.

WESSON, WILLIAM H. **Labor Skill Survey in South Carolina.** University of South Carolina, School of Business Administration, Bureau of Business and Economic Research, Columbia, S.C. (Monograph; started 1963; EDC, 1965.)

This is a survey of current labor skills in South Carolina compared with both present and projected skill requirements based on changes in the "industrial mix" of the State and in technology.

WILPUETZ, ROBERT. **Effects of Automation on Employee Morale and Productivity in a Bank: A Case Study.** George Washington University, School of Government, Business, and International Affairs, Center for the Behavioral Sciences, Washington, D.C. (Article; started 1962; EDC, 1965.)

This is a case history of sociological aspects of the organization. Attitudes before automation, at the time of initiation of automation, and 3 months after the installation of automated equipment will be studied by means of questionnaires and intensive interviews with management and employees.

YOUNG, JAMES E. **Development of Methodology for the Study of Employment Effects of Automation in Selected Arizona Industries.** University of Arizona, College of Business and Public Administration, Department of Economics, Tucson, Ariz. (Article; started 1961; EDC, 1964.)

The study embraces a comprehensive survey of the literature on the subject since 1950. Primary objectives are to derive some precision as to the meaning of the term automation and to construct a suggested methodological approach for empirical study of industries in the State of Arizona.

For other projects pertaining to

AUTOMATION AND IMPACTS ON LABOR

see:

Barwick, Ralph P., *et al.* Identification of Agricultural Occupations Other Than Farming, and the Scientific and Technical Education Needed for Employment and Advancement in These Occupations in Delaware Section 1

Cottrell, W. Frederick. Impact of Technological Change on Railway Workers in the United States, Britain, and New Zealand Section 7

Davis, Louis E., *et al.* Pilot Study of Evolving Jobs and Skills Section 5

Fogel, Walter A. Technological Change and the Work Force in Retail Trade Section 7

Hamilton, C. Horace and Selz C. Mayo. Social and Economic Significance of Recent Population Trends in North Carolina Section 9

Hardin, Einar. Postwar Changes in Productivity and Their Correlates Section 2

Heald, Morrell. Mass Production and Managerial Ideologies, or the Social Relations of Business Management Section 2

Leaming, George F. Changes in the Composition of the Labor Force in the Primary Copper Industry Section 7

Levinson, Harold M., *et al.* Manpower Adjustment to Technological Innovation in American Transportation Section 7

Mahar, James F. and Lloyd G. Marts. Impact of Automation on Employment in the Power Laundry Industry—Preliminary Analysis Section 7

Mesthene, Emmanuel G. and collaborators. University Program on Technology and Society Section 2

Miljus, R. C., *et al.* Factors in Successful Labor Market Adaptations: Implications for Training and Retraining Section 9

Peck, Sidney M. The Terminal Worker: A Study in Occupational Uprootedness Section 9

Schwitter, Joseph P. Personnel Problems of Data Processing Work Groups Section 5

Sinclair, Robert O. Effects of Farm Consolidation and Abandonment on Rural Vermont Communities Section 1

Sizer, Leonard M. The Social and Economic Consequences of Changes in Employment Upon Selected Communities Section 9

Weidenbaum, Murray L. and collaborators. Economic Implications of the National Space Program Section 6

Williams, Lawrence K. and Ned A. Rosen. Training and Retraining: An Examination of Adult Learning Section 9

SECTION 13

Innovation, Including Impacts of Specific Inventions and New Processes

DELPHENDAHL, JOHANNES, *see* HYATT, STEPHEN, *et al.*

DONAT, EUGENE R. **Information Technology and the Managerial Hierarchy.** University of Iowa, School of Business Administration, Department of Labor and Management, Iowa City, Iowa. (Dissertation; started 1960; EDC, 1964.)

This is a study of applications and techniques of information technology, the influence of this development on the structure and operation of various levels of line and staff managers, and the socioeconomic impact on the individual in management. The methodology includes analysis and projection of current practices and trends detected in business, industry, and Government.

ESTEP, SAMUEL D. **Mass Media of Communications and Manipulation. The Mass Mind, With Emphasis on Space Communications Satellites.** The University of Michigan, School of Law, Ann Arbor, Mich. (Articles; started 1961.)

This is an attempt to analyze the impact of research developments in the physical and psychological sciences which affect methods of communicating with large groups and of attempting to influence group action.

ESTEP, SAMUEL D. AND EDWARD H. FORGOTSON. **Radiation Exposures and Their Legal Impact.** The University of Michigan, School of Law, Ann Arbor, Mich. (Articles; started 1960; EDC, 1965.)

This is a study of scientific literature dealing with exposure to radiation, conducted for the purpose of analyzing legal consequences of these dangers and suggesting statutory modifications needed to cope with such matters more effectively.

FOLTMAN, FELICIAN F. Electronic Data Processing Changes Supervisors' Jobs. Cornell University, School of Industrial and Labor Relations, Department of Organizational Behavior, Ithaca, N.Y. (Papers; started 1963.)

This investigation of the impact of electronic data processing on supervisory behavior in a steel foundry will focus on the acceptance of change and enlargement of responsibilities. Method of investigation is by interviews and survey research.

FORGOTSON, EDWARD H., *see* ESTEP AND FORGOTSON.

GILMORE, JOHN S., *see* PLUNKETT AND GILMORE.

GOLD, BELA. Effects of Technological Innovations in the Steel-Producing and Steel-Using Industries on Natural Resource Requirements. University of Pittsburgh, Graduate School of Business, Pittsburgh, Pa. (Monograph; started 1962; EDC, 1964.)

This is an analysis of major technological innovations in coal and iron mining, coke, blast furnace, and steelmaking industries as well as the automobile, canmaking, and pipe-using industries. The objective is to determine the effects of these innovations on the nature, volume, and other characteristics of natural resource input requirements.

HEIDEN, EDWARD J. Some Economic Implications of United States Communications Satellite Policy. University of Wisconsin, Department of Economics, Madison, Wis. (Dissertation; started 1963; EDC, 1964.)

The dissertation will assess the extent to which U.S. communications satellite policy is conducive to the achievement of three major goals of the COMSAT Act of 1962: (*1*) telephone rate reduction to consumers, (*2*) public service provision to underdeveloped countries, and (*3*) goal of future additional (possibly competitive) satellite systems. From the analysis, conclusions for future COMSAT policy may be drawn.

HIRSCH, WERNER Z. Transformation of New Knowledge for Economic Growth. University of California, Institute of Government and Public Affairs, Los Angeles, Calif. (Article; started 1964; EDC, 1964.)

An analytical inquiry will be conducted into the obstacles which stand in the way of transforming new knowledge into commercial uses. It will also explore new means of overcoming these obstacles.

HORNE, WILLIAM J. **Entrepreneurial Aspects of High-Speed Computing.** Boston College, Department of Economics, Chestnut Hill, Mass. (Dissertation; started 1958; EDC, 1965.)

This is a study of: (*1*) the installation of several computers of varying capacities in firms ranging from 150 to 4,000 employees and (*2*) the factors available to the entrepreneur for making decisions to install electronic computers. A comparison will be made of the degree to which results met expectations and the reasons for variances. Conclusions will be drawn regarding the estimated effect on the total economy of the introduction of high-speed computing in industry.

HYATT, STEPHEN, JOHANNES DELPHENDAHL, AND FRANCIS E. MONTVILLE. **Impact of a Space Facility on a Small Community: A Case Study of Andover, Maine.** University of Maine, College of Agriculture, Department of Agricultural Business and Economics, Orono, Maine. (Bulletin, article; started 1963; EDC, 1964.)

This is a study to determine the social and economic changes brought about in the local community as a result of the establishment of the Telstar transmitting and receiving station. It includes implications for the future with a view to effective planning for the space age. The method of study includes interviews with a sample of the population.

MACHLUP, FRITZ AND ALEXANDER G. VICAS. **The Lag of Unrestricted Imitation Behind Product Innovation.** Princeton University, Department of Economics, Princeton, N.J. (Machlup), and Loyola College, Department of Economics, Montreal, Canada. (Vicas). (Dissertation; started 1962; EDC, 1965.)

These case studies investigate novel products, chiefly consumers' goods, that were quickly imitated by competitors with the immediate effect of drastically reducing original prices. The products either were not patentable or the patents proved ineffective. The main objective of the study is to measure the speed and effectiveness of new competition imitating novel products.

MONTVILLE, FRANCIS E., *see* HYATT, STEPHEN, *et al.*

PEACH, W. N., RICHARD W. POOLE, AND JAMES TARVER. **Economic Study on 564 Counties of the States of Arkansas, Iowa, Kansas, Missouri, Nebraska, and Oklahoma.** University of Oklahoma, Research Institute, Norman, Okla. (Peach), and Oklahoma State University of Agriculture and Applied Science, Stillwater, Okla. (Poole and Tarver). (Report; started 1962; EDC, 1964.)

This study is designed to develop a methodology for measuring the short- and long-term effects of increased participation in space technology on the economies of six States. An analysis of the technical capabilities of these States in determining the optimum direction of future economic effort will also be made. This study is being conducted in cooperation with faculty members at the Universities of Arkansas, Missouri, Iowa, Nebraska, and Kansas.

Plunkett, Jerry D. and John S. Gilmore. **NASA Contributions to Inorganic Coating Technology.** University of Denver, Denver Research Institute, Denver, Colo. (Report; started 1963; EDC, 1964.)

The National Aeronautical Space Administration's contributions to technology in the field of inorganic coatings are being identified, with special emphasis on those with potential commercial applications. Data are being gathered from NASA centers and checked with commercial firms in appropriate fields. Flow of scientific and technological information about inorganic coatings is also being investigated.

Poole, Richard W., *see* Peach, W. N., *et al.*

Simmons, James, *see* Smock and Simmons.

Smock, Robert and James Simmons. **Detroit Area Traffic Study.** The University of Michigan, Center for Urban Studies, Dearborn, Mich. (Monographs, papers; started 1964; EDC, 1965.)

This project will ascertain the implications of advances in computer technology and of the behavioral sciences for the problem of urban population mobility. It will apply the results of such advances to development of computer models which simulate future urban populations in daily motion in order to test proposed private and public transportation systems in relation to alternate land-use plans.

Stevens, J. Richard. **Study of Administrative Uses of Computers for Instructional Cost Analysis in Colleges and Universities of the United States.** Florida State University, School of Business, Department of Marketing, Tallahassee, Fla. (Monograph; started 1962; EDC, 1964.)

This is a study of the current status of computerized instructional cost analysis in colleges and universities. The method of investigation will consist of a nationwide survey of institutions and the intensive study of secondary data.

Tarver, James, *see* Peach, W. N., *et al.*

Vicas, Alexander G., *see* Machlup and Vicas.

For other projects pertaining to

INNOVATION, INCLUDING IMPACTS OF SPECIFIC INVENTIONS AND NEW PROCESSES

see:

Coe, Rodney M. and Albert F. Wessen. Acceptance of an Innovation Section 9

Conrad, Alfred H. Innovations, Size of Firms, and the Observed Production Function Section 2

Coupe, John D. Impact of the Space Program on the Rubber Industry Section 7

De Grazia, Alfred. Social Invention Section 9

Estep, Samuel D. Doing Nuclear Business Across International Lines Section 4

Fuller, Earl I. Economics of Feed Handling on Dairy Farms Section 1

Gates, James E. The Management of Creativity Section 5

Gold, Bela, *et al.* Major Technological Change: A Case Study in the British Steel Industry Section 4

Griffiths, J. C., *et al.* Operations Research in Mineral Resource Development Section 14

Guest, Robert H. Socio-Technical Systems Section 9

Jacobs, Norman G. Underdevelopment Reconsidered: An Institutional-Sociological Case Study of Iran Section 10

Jaffee, Abram J. Study of the Impact of Technological Change on the Total Labor Force Section 12

Karsh, Bernard and Jack Siegman. Work and Organizational Correlates of Technological Change Section 5

Karsh, Bernard and Solomon B. Levine. Long-Run Impact of Technological and Organizational Changes on the Nature of Industrial Relations and Structure and Function of the Labor Movement in Japan Section 4

Klonglan, Gerald E., *et al.* Role of a Free Sample Offer in the Adoption of a Technological Innovation Section 1

Lucas, Robert E., Jr. Investment in Technological Change Section 2

Maki, Wilbur R. Effects of Agricultural Adjustment on the Growth of Farm-Related Business Section 1

Mansfield, Edwin. The Economics of Innovation and Technical Change Section 2

Markham, Jesse W., *et al.* The Microeconomic Analysis of Inventive Activity and Technological Change Section 2

Meier, Richard L. The Settlement of the Seas Section 10

Mesthene, Emmanuel G. and collaborators. University Program on Technology and Society Section 2

Miller, E. Willard. Evolution of the Economy of the Appalachian Coal Region Section 7

Miller, Ronald E. and David Sawers. Efficiency in Commercial Air Transportation and Innovations in the Aircraft Industry Section 7

Polopolus, Leo and Fred H. Wiegmann. Economic Potential for Additional Vegetable Processing Facilities in South Central Louisiana Section 1

Polson, Robert A. Technological Change in the Rural Philippines Section 4

Preston, Lee E. History of Communications Satellite Corporation Section 7

Sandmeyer, Robert L. An Investigation of the Economic and Social Consequences of Automation Section 2

Savage, Charles H., Jr. and W. G. Bennis. Human and Organizational Consequences of Two Computer Installations in South America Section 4

Strassmann, W. Paul. Industrial Research Organization and the Transfer of Technology to Underdeveloped Countries .... Section 10

Whisler, Thomas L. Computer Technology and the Structure of Organization .... Section 5

Wiegmann, Fred H., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions .... Section 1

Williams, Lawrence K. Impact of Automation on Management Decision-Making and on Job Structure .... Section 14

Yavitz, Boris. Bank Automation—Its Process and Impacts: A Case Study and Conceptual Analysis .... Section 7

SECTION 14

Decision-Making

AMMER, DEAN S. AND ERNEST M. DECICCO. Automation and Its Effect on Employment in the Gray Iron Foundry Industry. Northeastern University, College of Business Administration, Bureau of Business and Economic Research, Boston, Mass. (Monograph, report; started 1964; EDC, 1965.)

This study involves a detailed analysis of capital investment decisions, job making, and other end products of automation decisions at a select group of gray iron foundries. The major method of investigation will consist of visits to a select group of foundries.

ANSOFF, H. I., *see* BRANDENBURG AND ANSOFF.

BAKER, NORMAN R., *see* RUBENSTEIN, ALBERT H., *et al.*

BRANDENBURG, RICHARD G. AND H. I. ANSOFF. Impact of Research and Development on Management Planning. Carnegie Institute of Technology, Graduate School of Industrial Administration, Pittsburgh, Pa. (Papers, articles; started 1964; EDC, 1966.)

This investigation—based on case studies, examination of company documentation, and data on project characteristics—is a descriptive analysis of decision processes of industrial R&D management as they relate to the firm as a whole. The purpose of the study is to obtain improved understanding of the reasons for loose coupling between company goals, overall R&D performance, and resource allocation criteria stemming from the R&D function. Specific areas of interest will include: (*1*) comparative analyses of differences in the R&D competence of firms as they relate to differences in product-market patterns, (*2*) effects of R&D on the formulation of business strategy in different types of firms and industries, (*3*) problems arising between R&D departments and other functions within these firms, and (*4*) characteristics of the R&D process which are relevant to the design systems for management planning and control.

DECICCO, ERNEST M., *see* AMMER AND DECICCO.

GRIFFITHS, J. C., JOHN J. SCHANZ, JR., AND JAMES F. MCDIVITT. Operations Research in Mineral Resource Development. The Pennsylvania State University, School of Mineral Industries, University Park, Pa. (Articles; started 1963; EDC, 1966.)

This is an investigation of operations research techniques to determine how and where they can be applied to decision-making on broad problems of exploration, development, production, and distribution of mineral raw materials. The basic objective is to establish criteria for quantitative evaluation which will lead to more efficient exploration of mineral resources. The method of investigation will include case studies, the first of which involves determining the economic gain which can be expected from the systematic exploration of a large area.

HAMBERG, DANIEL. Statistical Analysis of R&D Expenditures. State University of New York at Buffalo, School of Business Administration, Department of Economics, Buffalo, N.Y. (Book, articles; started 1962; EDC, 1964.)

A multivariate cross-section analysis of a number of potential determinants of R&D expenditures of some 1,000–2,000 firms in 20 industries is being undertaken for the year 1958. The object is to uncover the factors which appear to be more or less consistently important in determining the decisions relating to the magnitude of R&D expenditures in the individual firm.

HANNENBERG, RICHARD C., *see* **RUBENSTEIN, ALBERT H.,** *et al.*

LOVEJOY, FREDERICK A. Research and Development Project Abanment Decisions. University of Connecticut, School of Business Administration, Department of Industrial Administration, Storrs, Conn. (Report; started 1963; EDC, 1965.)

The purpose of this research is to examine R&D abandonment decisions and describe how, and by whom, such decisions are made. A group of selected large companies will be surveyed. The report will aid managers in developing a system for measurement and evaluation of R&D projects for "the best" allocation of company resources and help them determine when to abandon R&D activities and reallocate resources.

The method of study will include: (*1*) survey of the literature concerning the subject, (*2*) personal interviews with a number of staff and operating persons in industry, and (*3*) a mail questionnaire.

MCDIVITT, JAMES F., *see* **GRIFFITHS, J. C.,** *et al.*

POUND, WILLIAM H., *see* **RUBENSTEIN, ALBERT H.,** *et al.*

RUBENSTEIN, ALBERT H., RICHARD C. HANNENBERG, WILLIAM H. POUND, JACK SIEGMAN, NORMAN R. BAKER, AND JAMES UTTERBACK. **A Decision-Making Study of Idea Generation and Project Selection in Industrial Research and Development.** Northwestern University, The Technological Institute, Department of Industrial Engineering, Evanston, Ill. (Papers; started 1962; EDC, 1965.)

The study involves observations of idea generation and screening and of project selection in several industrial laboratories. Research methods involve sampling observations, committee observations, questionnaires, interviews, and examination of laboratory and company records.

RUBENSTEIN, ALBERT H., WILLIAM H. POUND, AND NORMAN R. BAKER. **Criteria for Evaluating R&D Output.** Northwestern University, The Technological Institute, Department of Industrial Engineering and Management Sciences, Evanston, Ill. (Articles, dissertations; started 1963; EDC, 1970.)

The study concerns development of technical, economic, and organizational criteria for selecting R&D projects and evaluating outcomes. It will also examine and adapt the many proposed formulas for project selection and evaluation.

SCHANZ, JOHN J., JR., *see* GRIFFITHS, J. C., *et al.*

SIEGMAN, JACK, *see* RUBENSTEIN, ALBERT H., *et al.*

STEPHENS, STEPHEN V. **Consensus Formation in Government Science Policy.** Yale University, Department of Political Science, New Haven, Conn. (Dissertation; started 1964; EDC, 1965.)

This is a study of the processes by which scientists reach consensus on what is important and valid and of the ways in which such agreement helps shape Government science policy.

STRASBURG, LOUIS G. **Criteria for the Evaluation of Scientific Proposals.** University of California, Graduate School of Business Administration, Department of Management Theory, Los Angeles, Calif. (Report; started 1964; EDC, 1965.)

This is an evaluation of the criteria and processes by which scientific proposals are selected, funded, managed, and terminated.

UTTERBACK, JAMES, *see* RUBENSTEIN, ALBERT H., *et al.*

WILLIAMS, LAWRENCE K. Impact of Automation on Management Decision-Making and on Job Structure. Cornell University, School of Industrial and Labor Relations, Department of Human Resources and Administration, Ithaca, N.Y. (Articles; started 1961; EDC, 1965.)

This is a series of case studies of the effect of large-scale computers and numeric-control machines on management decision-making and on organizational and job structure. The method consists of extensive interviews and observations at a number of sites.

WOOD, ROBERT C. Policy-Making Implications of Large-Scale Government Research Programs. Massachusetts Institute of Technology, School of Industrial Management, Cambridge, Mass. (Articles; started 1962.)

This project explores the policy-making processes in Government, universities, and laboratories as they have been affected by large-scale Government research programs. Major sectors of the study are devoted to: (*1*) implications of the space program for policy-making in foreign affairs, (*2*) decision-making process at the level of the individual scientist, and (*3*) effects of the space program on university research plans and major decisions in the National Aeronautics and Space Administration.

For other projects pertaining to

DECISION-MAKING

see:

DEAN, BURTON V. Quantitative Methods in Research Management Section 5

KLONGLAN, GERALD E., *et al.* Role of a Free Sample Offer in the Adoption of a Technological Innovation Section 1

MOWITZ, ROBERT. Technological Change and Economic Adjustment Section 6

ROBERTS, EDWARD B. Model of Laboratory Effectiveness Section 5

SAVAGE, CHARLES H., JR. AND W. G. BENNIS. Human and Organizational Consequences of Two Computer Installations in South America Section 4

SCHILLING, WARNER R. The H-Bomb Decision Section 6

TOLLEFSON, JOHN O. An Approach to Defense-Aerospace Marketing and Market Planning Section 8

WALKER, ODELL L. Economic Efficiency in the Production of Field Crops in Oklahoma Section 1

WIEGMANN, FRED H., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions Section 1

WILKENING, EUGENE A. AND ROBERT RIECK. Work and the Decision-Making Role of Wife and Family Goals as Related to Farm Structure and Functioning Section 1

APPENDIX A

Cross-References to Projects Which Also Pertain to Science Information, Space and State and Regional Studies

SCIENCE INFORMATION

COUGHENOUR, CHARLES M., *et al.* Factors Affecting the Spread of Improved Farm Practices in Kentucky .... Section 1

DAVIS, GORDON B. The Management Science Approach in Accounting: Use of Computer Models in the Analysis and Design of Systems .... Section 5

DILLON, ROBERT L., *et al.* Aerospace Technological Applications .... Section 10

HOFFENBERG, MARVIN AND SIDNEY SONENBLUM. Improved Utilization of NASA-Generated Data .... Section 6

HOROWITZ, IRA. The Economic Effects of the Distribution of Scientific Talent .... Section 8

KLONGLAN, GERALD E., *et al.* Role of a Free Sample Offer in the Adoption of a Technological Innovation .... Section 1

LIONBERGER, HERBERT F. AND REX R. CAMPBELL. Social and Cultural Factors Affecting the Dissemination and Use of Scientific Farm Information by Missouri Farmers .... Section 1

MARQUIS, DONALD G., and collaborators. Organization Research Program .... Section 5

MENZEL, HERBERT AND JULIAN NIXON. Chemists' Information: Formal and Informal Satisfaction of Information Requirements of Scientists Section 8

PLUNKETT, JERRY D. AND JOHN S. GILMORE. NASA Contributions to Inorganic Coating Technology .... Section 13

RUBENSTEIN, ALBERT H. AND GUSTAVE J. RATH. Researchers' Needs for Information .... Section 8

TOWNSHEND-ZELLNER, NORMAN AND WERNER Z. HIRSCH. Transformation of New Knowledge Into Commercial Uses .... Section 2

SPACE

DILLON, ROBERT L., *et al.* Aerospace Technology Applications .... Section 10

ESTEP, SAMUEL D. Mass Media Communications and Manipulation. The Mass Mind, With Emphasis on Space Communications Satellites .... Section 13

GLASSON, JOHN E. Federal Policy Organization for Science, 1957–62: The Congressional Position and Role .... Section 6

GRIGG, CHARLES M. AND ROBERT M. GRIFFIN, JR. The Impact of the Space Program on Community and Governmental Organization .... Section 9

HEIDEN, EDWARD J. Some Economic Implications of United States Communications Satellite Policy .... Section 13

HYATT, STEPHEN, *et al.* Impact of a Space Facility on a Small Community: A Case Study of Andover, Maine .... Section 13

KASH, DON E. International Cooperation in Space: The American Experience .... Section 6

KLUCKHOHN, RICHARD. Ecological and Biogeographical Consequences of Massive Technological Enterprises: The Space Program as a Case Study .... Section 7

PEACH, W. N., *et al.* Economic Study on 564 Counties of the States of Arkansas, Iowa, Kansas, Missouri, Nebraska, and Oklahoma .... Section 13

PRESTON, LEE E. History of Communications Satellite Corporation Section 7

ROBERTS, EDWARD B. New Approaches to Project Management .... Section 2

WOOD, ROBERT C. Policy-Making Inmplications of Large-Scale Government Research Programs .... Section 14

STATE AND REGIONAL STUDIES

STATE

Arizona

PAWSON, WALTER W., *et al.* Economics of Adjustments in Beef Production in Arizona .... *Section 1*

YOUNG, JAMES E. Development of Methodology for the Study of Employment Effects of Automation in Selected Arizona Industries .... Section 12

Arkansas

CHARLTON, J. L. Analysis of the Social and Economic Effects of the Movement of Farm People .... Section 1

California

BERNSTEIN, IRVING, *et al.* The Changing Status of Skilled Workers in a Technologically Dynamic Industry .... Section 12

FOGEL, WALTER A. Technological Change and the Work Force in Retail Trade .... Section 7

PUFFER, FRANK. The Impact of Defense Expenditures on the San Diego Area .... Section 6

ZUCKERMAN, JOHN V. AND ELLIOT BEIDEMAN. A Model of the Industrial Diversification Process: Employment of Federally Sponsored Technology in Commercial Enterprises .... Section 2

Colorado

BARKLEY, PAUL AND PETER E. HILDEBRAND. Appraisal of Opportunities for Adjusting Eastern Colorado Farming to Prospective Markets .... Section 1

MAHAR, JAMES F., *et al.* The Scientific Complex: Challenge to Colorado .... Section 10

WELLES, JOHN G. AND CHARLES H. PRIEN. Oil Shale: Economic Implications of a New Industry .... Section 7

Delaware

Barwick, Ralph P., *et al.* Identification of Agricultural Occupations Other Than Farming, and the Scientific and Technical Education Needed for Employment and Advancement in These Occupations in Delaware.. Section 1

Florida

Grigg, Charles M. and Robert M. Griffin, Jr. The Impact of the Space Program on Community and Governmental Organization........ Section 9

Indiana

Oliker, L. Richard. An Interpretative Study of Growth and Development in the Ethical Drug Industry .... Section 7

Iowa

Hoyt, Elizabeth E. and Eleanor M. Shepherd. Economic-Cultural Adjustment of American Indians, Cith Special Reference to One Group of Tama, Iowa .... Section 9

Maki, Wilbur R. Effects of Agricultural Adjustment on the Growth of Farm-Related Business .... Section 1

Kansas

McKinney, R. D., *et al.* Kansas Area Development .... Section 1

Kentucky

Coughenour, Charles M., *et al.* Factors Affecting the Spread of Improved Farm Practices in Kentucky .... Section 1

Rudd, Robert W., *et al.* Development Patterns in Kentucky Agriculture .... Section 1

Louisiana

Polopolus, Leo and Fred H. Wiegmann. Economic Potential for Additional Vegetable Processing Facilities in South Central Louisiana........ Section 1

Taylor, M. Lee. Study of Two Agribusiness Careers .... Section 8

Wiegmann, Fred H., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions .... Section 1

Maine

Hyatt, Stephen, *et al.* Impact of a Space Facility on a Small Community: A Case Study of Andover, Maine .... Section 13

Massachusetts

Blackmore, John, *et al.* Economic Assessment of the Competitive Position and Potential Supply Response of Massachusetts Dairy Farmers Section 1

Enos, John L. A Study of the Origin and Growth of New Enterprises .... Section 2

Michigan

BACON, FRANK R., JR. A Firm-Level Study of the Effect of Science and Technology on Economic Growth	Section 2
BACON, FRANK R., JR., AND KENNETH R. BAYER. Research Emphasis in Michigan Universities	Section 2
CHASTIAN, CLARK E., *et al.* Financing New Research and Development Oriented Enterprises as Compared With New Formations and Expansions of Other Manufacturing Firms in Michigan	Section 5
CRAFTON, L. JOSEPH. Defense Business in Michigan	Section 6
SCHULTZ, STUART J., *et al.* The Use of Advanced Technology in the Tool and Die Industry of Michigan	Section 7
SMOCK, ROBERT AND JAMES SIMMONS. Detroit Area Traffic Study	Section 13

Minnesota

BURK, MARGUERITE AND IRVING TALLMAN. A Comparison of Mobility Patterns in Rural and Urban Low Income Areas	Section 9
FIENUP, DARRELL F. AND DALE C. DAHL. Minnesota Agribusiness Structural Adjustment in the Agribusiness Sector of the Minnesota Economy	Section 1
HESS, CARROLL V. Coordinated Egg Production and Marketing Programs in Minnesota	Section 1
JENSEN, HARALD R. AND CARMEN O. NOHRE. Production Adjustments and Supply Response for Hog and Beef Cattle Production in Minnesota	Section 1
SUNDQUIST, WESLEY B. AND HARALD R. JENSEN. Adjustments of Farm Production and of the Structure of Farming in Minnesota to Economic Change	Section 1

Missouri

LIONBERGER, HERBERT F. AND REX R. CAMPBELL. Social and Cultural Factors Affecting the Dissemination and Use of Scientific Farm Information by Missouri Farmers	Section 1
MURRY, DONALD. Scientific Research in Missouri	Section 10
VOSS, LEONARD A. Effect of Coordinated Egg Production-Marketing Technology Upon Market Channels and Institutions in Missouri and the North Central States	Section 1
WHITTED, STEPHEN F. Market Organization and Structure of the Missouri Dairy Industry	Section 1

Montana

BROWDER, GORDON. Technological Change and the Rural Farm Population of Montana	Section 1

New Mexico

BLUMENFELD, ARTHUR A. AND RALPH L. EDGEL. Economic Development of New Mexico Since Statehood: Economic Base Study of New Mexico—Part I	Section 2
BLUMENFELD, ARTHUR A. Inter-Industry Relations Analysis: Economic Base Study of New Mexico—Part II	Section 2

Blumenfeld, Arthur A. and Ralph L. Edgel. Projections of the Economy to 1975: Economic Base Study of New Mexico—Part III ______ Section 2

Stucky, H. R. and Donald C. Henderson. Resources Inventory and Structure of Agriculture ______ Section 1

New York

Conklin, Howard E. A Study of the Extent and Intensity of Farming in Eastern New York State ______ Section 1

Foltman, Felican F. White Collar Redundancy ______ Section 12

Liu, Ta-Chung and George H. Hildebrand. Manufacturing Productions Functions in the United States ______ Section 2

North Carolina

Ihnen, L. A., *et al.* An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions ______ Section 1

Sutherland, J. Gwyn and C. E. Bishop. An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions ______ Section 1

Ohio

Bottum, John S. and Mervin G. Smith. Analysis of the Impact of Past and Present Agrictutural Policies on the Quantities of Agricultural Products Marketed, Channels Used in Marketing, and Market Structure in Ohio ______ Section 1

Peck, Sidney M. The Terminal Worker: A Study in Occupational Uprootedness ______ Section 9

Oklahoma

Plaxico, James S., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Oklahoma To Meet Changing Conditions ______ Section 1

Walker, Odell L. Economic Efficiency in the Production of Field Crops in Oklahoma ______ Section 1

Pennsylvania

Butz, W. T. and C. W. Pierce. Milk Assembly, Processing, and Distribution Systems and Practices ______ Section 7

Frey, John C., *et al.* The Impact of Highway Improvement on Land Use, Business Enterprise, and Community Development in Seclected Areas of Pennsylvania ______ Section 10

Gamble, Hays B., *et al.* Application of an Input-Output Model to "Microregional" Analysis ______ Section 2

Harms, Louis T. and Rosella James. Development of Labor-Force Employment and Unemployment Data for the 67 Counties of Pennsylvania ______ Section 12

Tripp, L. Reed. Automation and White-Collar Job Trends in the Lehigh Valley Labor Market ______ Section 12

South Carolina

Hubbard, John W., *et al.* An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of South Carolina To Meet Changing Conditions ____ Section 1

Wesson, William H. Labor Skill Survey in South Carolina ____ Section 12

Texas

MacNaughton, John F., *et al.* An Investigation of the Social, Psychological, and Economic Impacts on the Workers Affected by the Humble Oil and Refining Company's Work-force Reduction at Baytown, Texas ____ Section 12

Moore, Donald S., *et al.* Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Texas To Meet Changing Conditions Section 1

Shafer, Carl. Marketing Structure for Broilers in Texas ____ Section 1

Utah

Arrington, Leonard J. and George Jensen. The Impact of Defense Installations and Defense Manufacturing on the Economy of Utah ____ Section 6

Vermont

Sinclair, Robert O. Effects of Farm Consolidation and Abandonment on Rural Vermont Communities ____ Section 1

Virginia

Gibson, William L. and Harry M. Love. Tenure Adjustments in Farm Consolidation ____ Section 1

Hoepner, Paul H., *et al.* Optimum Allocation of Farm Resources in Northeastern Virginia ____ Section 1

Kline, Ralph G. Economic Appraisal of Farming Adjustment Opportunities in Southside Virginia ____ Section 1

West Virginia

Kriesel, Herbert C. Some Changes in Interregional Competitive Relationships for Broilers and Eggs With Particular Reference to West Virginia ____ Section 1

Sizer, Leonard M. The Social and Economic Consequences of Changes in Employment Upon Selected Communities ____ Section 9

Wisconsin

Peterson, Gustof A. and Sydney D. Staniforth. Adjustments in Dairy Farming in Wisconsin To Meet Changing Conditions ____ Section 1

Wyoming

Kearl, Willis G. and Delwin M. Stevens. Economics of Livestock Production and Ranch Management in the Plains of Wyoming ____ Section 1

Regional

Appalachia

Miller, E. Willard. Evolution of the Economy of the Appalachian Coal Region ____ Section 7

Central U.S.

HASSLER, JAMES B. AND HOWARD W. OTTOSON. Effects of Technological Changes on Interarea Competition for the Livestock-Feed-Wheat Sectors of the Midwest .... Section 1

PEACH, W. N., *et al.* Economic Study on 564 Counties of the States of Arkansas, Iowa, Kansas, Missouri, Nebraska, and Oklahoma .... Section 13

WALKER, ODELL L. AND WILLIAM F. LAGRONE. Economic Appraisal of Farming Systems in the Great Plains .... Section 1

New England

SPENCER, MYRON J. Strategies of Technical Product Planning .... Section 5

South

PARTENHEIMER, E. J. AND P. L. STRICKLAND, JR. An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region To Meet Changing Conditions—Revised .... Section 1

West Coast

HAGSTROM, WARREN O. The Scientific Community: A Sociological Analysis .... Section 8

General

HOROWITZ, IRA. The Economic Effects of the Distribution of Scientific Talent .... Section 8

———. Regional Distribution of Scientific People .... Section 8

SAMPSON, ROY J. Transportation as a Factor in Regional Development .... Section 7

STEWART, CHARLES T., JR. A Study of the Role of Changing Regional Patterns of Research and Development and Science-Based Technology in Influencing Regional Development .... Section 2

APPENDIX B

Other Related Compilations of Research Projects

In addition to annual listings of current research projects by universities and professional associations, the following compilations of research projects related to the subject matter of this report are listed for reference:

NATIONAL SCIENCE FOUNDATION, OFFICE OF SCIENCE INFORMATION SERVICE. Current Research and Development in Scientific Documentation. Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office.

Published semiannually, the report describes current R&D projects in the United States and abroad in the field of scientific documentation. Included are studies of information requirements and uses, research on the storage and retrieval of information and on the mechanical translation of languages, the design of special-purpose equipment for processing linguistic and graphic information, and research which may be potentially related to scientific documentation in such areas as automatic programing, pattern and speech recognition, linguistic analysis, and artificial intelligence.

U.S. DEPARTMENT OF LABOR, OFFICE OF MANPOWER, AUTOMATION, AND TRAINING. Manpower, and Automation Research. Washington, D.C. 20210: Department of Labor, Office of Manpower, Automation and Training.

A list of research projects in the broad areas of manpower resources, requirements, development, and utilization conducted for the purpose of developing information and methods needed to deal with the problems of unemployment.

U.S. DEPARTMENT OF STATE, BUREAU OF INTELLIGENCE AND RESEARCH, EXTERNAL RESEARCH STAFF. External Research—A List of Studies Currently in Progress. Washington, D.C. 20520: Department of State.

An annual inventory of current research projects compiled on the basis of information furnished by private scholars throughout the United States. The series consists of individual pamphlets listing studies in progress on the following geographic and subject areas:

- U.S.S.R. and Eastern Europe
- Asia
- Western Europe, Great Britain, and Canada
- Middle East
- Africa
- American Republics
- International Affairs

Many of the studies listed deal with economic and social aspects of science and technology in connection with problems of economic development, progress, and growth in various parts of the world.

APPENDIX C

Status of Projects That Were Listed in *Current Projects on Economic and Social Implications of Science and Technology, 1963*

Section 1. Agriculture and Rural Sociology

Blackmore, John, Yoshihiro Maruyama, and E. I. Fuller. Economic Assessment of the Competitive Position and Potential Supply Response of Massachusetts Dairy Farmers. Continuing.

Bottum, J. S. and M. G. Smith. Analysis of the Impact of Past and Present Agricultural Policies on the Quantities of Agricultural Products Marketed, Channels Used in Marketing, and Market Structure in Ohio. Continuing.

Charlton, J. L. Analysis of the Social and Economic Effects of the Movement of Farm People. Continuing.

Conklin, H. E. Methods for Studying Decision-Making Processes. Completed.

Coughenour, C. M., A. L. Coleman, and N. P. Patel. Factors Affecting the Spread of Improved Farm Practices in Kentucky. Continuing, revised; see listing in this volume. Coughenour, "The Rate of Technological Diffusion Among Locality Groups," *Amer. J. Sociol.* 69:4, 325–339, Jan. 1964 (Lexington: Univ. of Kentucky.)

Darrah, L. B. Economic Study of New York Poultry Farms. Completed.

Dean, G. W., T. R. Hedges, and J. E. Faris. Changes in Technology and Practices, Farm Organizational Characteristics, Resource Availability, and Prices in Relation to Farm Costs and Earnings. Continuing. Petit, J. A., Jr. and Dean, "Economics of Farm Feedlots," *Calif Agr. Expt. Sta. Bull.* 800, May 1964 (Davis: Univ. of California). Dean and Michele De Benedictis, "A Model of Economic Development for Peasant Farms in Southern Italy," J. *Farm Econ.* 46:2, 295–312, May 1964.

Fienup, D. F. and D. C. Dahl. Minnesota Agribusiness Structural Adjustment in Agribusiness Sector of the Minnesota Economy. Continuing. Dahl and Fienup, "Minnesota Agribusiness Employment," *Minn. Farm Bsn. Notes* 464, July 1964 (St. Paul: Univ of Minnesota), 4 pp.

Fuller, E. I. Economics of Feed Handling on Dairy Farms. Continuing.

Fuqua, J. E. and H. G. Walkup. Economic Evaluation of Truck-Type Three-Hopper Fertilizer Spreader Use. Completed. "Bulk Fertilizer Spreading Practices in Kentucky With Special Emphasis on Three-Hopper Truck Spreader Custom Services," *Ky. Agr. Expt. Sta. Bull.* 683, May 1963, 42 pp., and "Three-Hopper Truck Fertilizer Spreaders Reduce Costs," *Univ. of Ky. Coop. Ext. Serv. Leaflet* 273, May 1964, 5 pp. (Lexington: Univ. of Kentucky).

Gibson, W. L. and H. M. Love. Tenure Adjustments in Farm Consolidation. Continuing.

Hagan, A. R. Family Farm Adjustments to Meet the Impact of Economic, Technological, and Sociological Change. Continuing. Hagan and W. N. Ross, "Part-Time Farming and the Family Farm," *Mo. Agr. Expt. Sta. Bull.* 807 (Columbia: Univ. of Missouri).

HATHAWAY, D. E. Economic Adjustment of Agriculture to Industrialization Growth and Change in the Nonfarm Economy. Continuing.

HESS, C. V. Coordinated Egg Production and Marketing Programs in Minnesota. Continuing.

HILDEBRAND, P. E. Appraisal of Opportunities for Adjusting Eastern Colorado Farming to Prospective Markets. Continuing; see Barkley, Paul and Hildebrand, listed in this volume.

HOEPNER, P. H., R. L. CHAMBLISS, JR., AND DONALD BURROWBRIDGE. Optimum Allocation of Farm Resources in Northeastern Virginia. Continuing.

HOGLUND, C. R. Adjustments in Dairy Farming To Meet Changing Conditions. Continuing. "Investments and Annual Costs for Concrete and Gas-Tight Silos for Dairy Farms," *Mich. Agr. Expt. Sta. Quart. Bull.* 46:3, 453–67, Feb. 1964, and Hoglund, R. L. Maddex, and W. W. Snyder, "Free-Stall vs. Conventional Loose Housing," *Farm Sci. Ser., Mich. Agr. Ext. Bull.* E383 (East Lansing: Michigan State Univ.).

HOUGHABOOM, V. R. Planning Processes Used by Farmers in Organizing and Operating Their Farm Businesses. Completed under new title, An Evaluation of Factors Influencing Participation in the Dairy Herd Improvement Program in Vermont.

JENSEN, H. R., T. H. FRANCE, AND L. RIXE. Farm Production Adjustments in the Red River Valley of Minnesota. Completed. Publication pending.

JENSEN, H. R. AND C. O. NOHRE. Production Adjustments and Supply Responses for Hog and Beef Cattle Production in Minnesota. Continuing. Nohre and Jensen, "Profitable Farm Adjustments in South-Central Minnesota," *Minn. Agr. Expt. Sta. Bull* 471, 1964 (St. Paul: Univ. of Minnesota).

KEARL, W. G. AND D. M. STEVENS. Economics of Livestock Production and Ranch Management in the Plains of Wyoming. Continuing. Kearl, "Cattle Price Behavior and Ranchers Decision-Making," *Wyo. Agr. Expt. Sta. Bull.* 408, Oct. 1963 (Laramie: Univ. of Wyoming).

KLINE, R. G. Economic Appraisal of Farming Adjustment Opportunities in Southside Virginia. Continuing. Walker, W., Kline, and C. J. Arnold, "Farm Adjustment Opportunities in Southside Virginia," *Va. Agr. Expt. Sta. Tech. Bull.* 150, May 1961, 47 pp., and Kline, "Economics of Adjustments for Small Flue-Cured Tobacco Farms," *Va. Agr. Expt. Sta. Tech. Bull.* 174, June 1964, 157 pp. (Blacksburg: Univ. of Virginia).

KLONGLAN, G. E., G. M. BEAL, AND J. M. BOHLEN. Role of a Free Sample Offer in the Adoption of a Technological Innovation. Continuing.

KOLLER, E. F. AND R. G. THOMPSON. Optimal Resource Allocation in the Manufacture of Dairy Products. Completed. Thompson and Koller, "Interplant Milk Transportation Costs," *Minn. Agr. Sta. Bull.*, June 1963 (St. Paul: Univ. of Minnesota) 24 pp.

KRIESEL, H. C. Some Changes in Interregional Competitive Relationships for Broilers and Eggs, With Particular Reference to West Virginia. Continuing.

LIONBERGER, H. F. AND R. R. CAMPBELL. Social and Cultural Factors Affecting the Dissemination and Use of Scientific Farm Information by Missouri Farmers. Continuing. "The Potential of Interpersonal Communicative Networks for Message Transfer From Outside Information Sources," *Mo. Agr. Expt. Stat. Res Bull.* 842, Sept. 1963, 45 pp.; Lionberger, "Legitimation of Decisions To Adopt Farm Practices and Purchase Farm Supplies in Two Missouri Farm Communities: Ozark and Prairie," *Mo. Agr. Expt. Sta. Res. Bull.* 826, Apr. 1963, 38 pp.; and Campbell, "Farm Operators' Standings in Their Communities," *Mo. Agr. Expt Sta. Res. Bull.* B796, 1963, 10 pp. (Columbia: Univ. of Missouri).

MADDOX, J. G. Effects of Differential Rates of Economic Growth in the Major Areas of North Carolina on the Market for Factors Used in Agricultural Production. Discontinued.

MAKI, W. R. Effects of Agricultural Adjustment on the Growth of Farm-Related Business. Continuing.

MARTIN, W. E. Capital-Labor Substitution and the Demand for Agricultural Labor in the Western Region. Discontinued.

MCALEXANDER, R. H., R. L. BAKER, AND E. L. MICHALSON. Economic Evaluation of Systems for Supplying Eggs. Completed. Publication pending.

MCKINNEY, R. D., R. E. DAKIN, L. H. DOUGLAS, D. A. KNIGHT, AND W. C. ROHRER. Rural Economic Development. Continuing under new title, Kansas Area Development. McKinney, "Development Survey Highlights for Northwest Kansas," *Kans. Agr. Expt. Sta. Bull.*, Oct. 1964 (Manhattan: Kansas State Univ. of Agr. and Appl. Sci.), 46 pp.

MOLLETT, J. A. Impact of Technology on Plantation Organization. Completed. "Technological Change in Hawaiian Sugar Production and Its Relationships to Productivity," *J. Agr. Econ.* 16, 88–97, June 1964. Publication of study pending.

MOORE, D. S., K. R. TEFERTILLER, AND R. H. ROGERS. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Texas To Meet Changing Conditions. Continuing. Hatch, R. E. and Moore, "Production and Production Requirement Costs and Expected Returns for Crop Enterprises, Lower Rio Grande Valley of Texas," *Tex. Agr. Expt. Sta.* MP719, and Moore and Tefertiller, "Production and Production Requirements, Costs, and Expected Returns for Crop Enterprises—High Plains of Texas," *Tex. Agr. Expt. Sta.* MP695 (College Station: Texas A&M Univ.).

MORRIS, W. H. M., R. L. EICHHORN, AND L. M. EISGRUBER. Status and Rehabilitation of the Farm Cardiac. Continuing.

PADFIELD, HARLAND AND W. E. MARTIN. Impact of Farm Mechanization on Farm Employment. Completed. Publication pending.

PARTENHEIMER, E. J. AND P. L. STRICKLAND. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Alabama To Meet Changing Conditions. Completed. "Optimum Farm Organization and Aggregate Area Production, Wiregrass Area, Alabama," *Agr. Expt. Sta., Agr. Econ. Ser.* 3, Mar. 1964 (Auburn: Auburn Univ.). For new project based on this research, see Partenheimer and Strickland in this volume.

PETERSON, G. A. AND S. D. STANIFORTH. Adjustments in Dairy Farming in Wisconsin To Meet Changing Conditions. Continuing. "Equilibrium Analysis of Income Improving Adjustments on Farms in the Lake States Dairy Region, 1965," *Tech. Bull.* 246, Oct. 1963, 54 pp.; Kimball, N. D. and Peterson, "Economic Evaluation of Alternatives for Developing Large Dairy Farms in Wisconsin," *Agr. Expt. Sta. Bull.* 571, July 1964, 38 pp.; and "New Facilities for a Larger Dairy Herd," *Wis. Agr. Expt. Sta. Spec. Cir.*, June 1964, 4 pp. (Madison: Univ. of Wisconsin).

PHIPPS, L. J., A. H. KREBS, PAUL HEMP, J. R. WARMBROD, AND GERAL FULLER. Technical Education in and for Rural Areas. Continuing. Technicians and Other Workers Who Need Technical Knowledge, Voc. and Tech. Dept., June 1964 (Urbana: Univ. of Illinois) 74 pp.

PLAXICO, J. S., O. L. WALKER, L. G. TWEETEN, AND W. F. LAGRONE. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Oklahoma To Meet Changing Conditions. Continuing. Martin, J. R., Lagrone, Plaxico, and L. J. Connor, "Effect of Changes in Product Price Relationships on Farm Organization and Income Clay Soil Farms—Southwestern Oklahoma," *Okla. Agr. Expt. Sta. Bull.* 621, Jan. 1964 (Stillwater: Oklahoma State Univ. of Agr. and Appl. Sci.).

Polopolus, Leo and F. H. Wiegmann. Economic Potential for Additional Vegetable Processing Facilities in South Central Louisiana. Continuing. Fairbanks, J. N. and Polopolus. "Economic Efficiency and Profitability of Okra and Okra-Tomato Canning Plants," ***Dept. Agr. Econ. Res. Rept.*****, La. Agr. Expt. Sta., Nov. 1964 (Baton Rouge: Louisiana State Univ. and Agr. and Mech. Coll.).**

Raskopf, B. D. Alternative Cotton Marketing Practices for Increasing Efficiency in Channels of Trade. Completed. "Factors Associated With Cotton Ginning Problems in Tennessee," ***Tenn. Agr. Expt. Sta. Bull.*** **366, Sept. 1963, and "Cotton Quality in Tennessee, 1961 and 1962 Crop Years,"** ***Tenn. Farm and Home Sci. Progr. Rept.*** **50, Tenn. Agr. Expt. Sta., Apr., May, June 1964 (Knoxville: Univ. of Tennessee).**

Raup, P. M. Tenure Arrangements for Low Equity Tenants. Continuing.

Ruttan, V. M., Donald Paarlberg, and Earl Kehrberg. Contribution of Technological Change to Agricultural Output in the United States. Completed. Publication pending.

Schlebecker, J. T. Scientific and Technical Development of American Agriculture. Continuing.

Shafer, Carl. Marketing Structure for Broilers in Texas. Continuing.

Storey, D. A. Grain Marketing Institutions and the Structure of Grain Markets. Discontinued.

Sundquist, W. B. and H. R. Jensen. Adjustments of Farm Production and of the Structure of Farming in Minnesota to Economic Change. Continuing. Sundquist, L. M. Day, and Jensen, "Income Improving Farm Adjustments in Southeastern Minnesota," ***Minn. Agr. Expt. Sta. Bull.*** **466, June 1963; Sundquist and James Holt, "Income Improving Adjustment Alternatives on Grade A Dairy Farms in Minnesota,"** ***Minn. Agr. Expt. Sta. Bull.*** **473, 1964; and Sundquist, J. T. Bonnen, D. E. McKee, C. B. Baker, and L. M. Day, "Equilibrium Analysis of Income Improving Adjustments on Farms in the Lake States Dairy Region, 1965,"** ***Minn. Agr. Expt. Sta. Tech. Bull.*** **246, Oct. 1963 (St. Paul: Univ. of Minnesota).**

Sutherland, J. G. and C. E. Bishop. An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of North Carolina To Meet Changing Conditions. Continuing, revised; see Sutherland and Bishop, An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions, in this volume.

Toussaint, W. D. and A. J. Coutu. An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of North Carolina To Meet Changing Conditions. Continuing, revised; see Ihnen, L. A. and Coutu, An Economic Appraisal of Farming Adjustment Opportunities in North Carolina To Meet Changing Conditions, in this volume. White, T. K., Coutu, R. L. Rizek, and Toussaint, "Farm Adjustments for Changes in Resource Levels, Product Prices, and Allotments: Northern Coastal Plain, Economic Area 7, North Carolina," ***Agr. Econ. Info. Ser.*** **103, June 1963 (Raleigh: North Carolina State of the Univ. of North Carolina), 51 pp.**

Voss, L. A. Effect of Coordinated Egg Production-Marketing Technology Upon Market Channels and Institutions in Missouri and the North Central States. Continuing.

Walker, O. L. Economic Efficiency in the Production of Field Crops in Oklahoma. Continuing. Walker, S. C. Wiggins, and Thomas Pogue, "An Economic Analysis of Fertilizer and Seeding Rates for Spinach Production in Eastern Oklahoma," ***Okla. Agr. Expt. Sta. Bull.*** **596, June 1962 (Stillwater: Oklahoma State Univ. of Agr. and Appl. Sci.).**

WALKER, O. L. AND W. F. LAGRONE. Economic Appraisal of Farming Systems in the Great Plains. Continuing. Hall, H. H., L. J. Connor, Walker, and Lagrone, "Resource Requirements, Costs, and Expected Returns, Alternative Crop and Livestock Enterprises, Oklahoma Panhandle," *Okla. Agr. Expt. Sta. Bull* 459, July 1963, and Connor, L. J. and Walker, "Minimum Resource Requirements for Specified Incomes; Clay-Loam Soils in The Oklahoma Panhandle," *Oklahoma C.F.E.* 37:1, 15–20, Mar. 1964 (Stillwater: Oklahoma State Univ. of Agr. and Appl. Sci.).

WEST, J. G. Secondary Economies in Concentration of Production of Dairy, Fruit, and Poultry Products. Continuing.

WHITTED, S. F. Market Organization and Structure of the Missouri Dairy Industry. Continuing.

WIEGMANN, F. H., L. L. FIELDER, JR., W. F. WOOLF, AND BILL BOLTON. Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Louisiana To Meet Changing Conditions. Continuing. Woolf, Wiegmann, and Fielder, "Farm Planning Guides for Small Farms in the Mississippi River Delta Area of Louisiana," *Dept. Agr. Econ. Cir.* 320, Feb. 1963, 79 pp., and "Variable Price Programming for a Small Cotton Farm in the Mississippi River Delta Area of Louisiana," *Dept. Agr. Econ. Res. Rep.* 323, Aug. 1963, 28 pp. (Baton Rouge: Louisiana State Univ. and Agr. and Mech. Coll.).

WILKENING, E. A. AND ROBERT RIECK. Work and the Decision-Making Role of Wife and Family Goals as Related to Farm Structure and Functioning. Continuing.

Section 2. General Economic Analysis

ARROW, K. J. AND H. B. CHENERY. Technology and Resource Allocation. Continuing.

BACON, F. R., JR. AND C. E. CHASTAIN. Stimulation of Research and Development With Emphasis on the Need in Michigan. Discontinued.

BECKER, J. F. The Classical (Economic) Philosophy of Science. Continuing. "Economic Integration and the Administration of Values," *Studies on the Left* 3: 49–78, Fall 1963 (Madison, Wis.: Editorial Board, Box 2121).

———. Political Economy of Integration. Continuing. "Utilitarian Logic and the Classical Conception of Social Science," *Science and Society* 161–82, Spring 1964, and "The Challenge of the Classic," *Studies on the Left* 4: 93–103, Winter 1964 (Madison, Wis.: Editorial Board, Box 2121).

BRADY, D. S. Technological Developments and Changes in the Price Structure. Completed. "Relative Prices in the Nineteenth Century," *J. Econ. His.* 24:2 145–203, June 1964.

BRANDENBURG, R. G. Determinants of Expenditures on Research and Development. Completed. Publications pending.

CONRAD, A. H. Empirical Study of Technological Change. Continuing. Brown, Murray, and Conrad, "Fundamental Variables in a Generalized System of Production: A Preliminary Report," *Econometrica*, 1964.

Enos, J. L. A Study of the Origin and Growth of New Enterprises. Continuing. "A Model of the Origin and Growth of New Enterprises," *Ind. Dynamics Res. Proj. Rep.*, School of Ind. Mgt. D–238, May 1961 (Cambridge: Massachusetts Institute of Technology), 60 pp.

Frankel, Marvin. Using Production Functions To Measure Technological Change. Continuing.

Gold, Bela. Estimating the Economic Effects of Technological Innovations. Completed. "Economic Effects of Technological Innovations," *Mgt. Sci.* 11: 105–34, Sept. 1964.

Griliches, Zvi. Econometric Studies of Technical Change. Continuing. "Research Expenditures, Education, and the Aggregate Production Function," *Amer. Econ. Rev.*, Dec. 1964 and "The Sources of Measured Productivity Growth: U.S. Agriculture, 1940–1960," *J. Pol. Econ.*, Aug. 1963. Griliches and Jacob Schmookler, "Inventing and Maximizing," *Amer. Econ. Rev.*, Sept. 1963.

Gruber, W. H. The Impact of Technological Change on the Economy. Continuing.

Hamberg, Daniel. Economics of Research and Development. Continuing.

Hardin, Einar. Postwar Changes in Productivity and Their Correlates. Continuing. "Measuring the Rate of Productivity Growth," *Productivity Measurement Rev.* 35, 5–13, Nov. 1963.

Heald, Morrell. Mass Production and Managerial Ideologies, or the Social Relations of Business Management. Continuing.

Hildebrand, G. H. and Ta-Chung Liu. Manufacturing Production Functions and Optimum Allocation of Resources. Continuing, revised; see Liu and Hildebrand, Manufacturing Production Functions in the United States, in this volume.

Leontief, W. W., E. W. Gilboy, Hendrik Houthakker, A. P. Carter, A. L. Daniere, C. E. Taskier, Clopper Almon, Phoebus Dhrymes, and David Simpson. Research Project on the Structure of the American Economy. Revised; see Carter, *et al.*, Technological Change in American Industry, 1947–58 and 1970, in this volume.

Lasser, A., Jr. Planning, Administration, and Control of Capital Expenditures in Industry. Temporarily discontinued.

Mansfield, Edwin. Econometric Studies of Research and Development. Continuing.

———. The Economics of Innovation and Technical Change. Continuing.

Merrill, R. S. Advances in Routine Engineering Design and Their Economic Significance. Continuing. "Scientific Communities and Technological Adaptation," *Symposia Studies Ser.* 13, 15–20, (Washington: Nat. Inst. of Soc. & Beh. Sci., George Washington Univ., 1964). "Engineering and Productivity Change: Suspension Bridge Stiffening Trusses," *Economics of Research and Development*, R. A. Tybout, ed. (Columbus: Ohio State Univ. Press, 1964.)

Murray, Donald. The Economic Consequences of R&D Activities. Continuing. "Scientific Research in Missouri," *Missouri Econ. Study* 5, Feb. 1965 (Columbia: Univ. of Missouri).

Phelps, E. S. and C. D. Phelps. A Comparative Study of Economic Growth. Continuing.

Schmookler, Jacob and Irwin Feller. Investment in Partially Obsolete Techniques. Continuing.

Smith, S. M., Jr. and M. B. Carter. Potential Small Business Expansion in Electronic and Related R&D Industries in the State of Maryland and Metropolitan Washington, D. C. Discontinued.

Stevens, J. R. Role of Private Business Research in the Economic Development of Florida. Completed. *Essays on Florida's Economic Development*, George Macesich, ed., pp. 89–137 (Tallahassee: Council on Econ. Develop. 1963).

Stewart, C. T., Jr. A Study of the Role of Changing Regional Patterns of Research and Development and Science-Based Technology in Influencing Regional Development. Continuing.

Tarnaja, Ram. Impact of Profit Sharing on the Introduction of New Technology. Completed. *Profit Sharing and Technological Change*, (Madison: Cent. for Productivity Motivation, Univ. of Wisconsin, 1964), 87 pp.

Tybout, R. A. Economics of Research and Development. Continuing.

Watson, D. S. and M. A. Holman. Productivity of Federally Financed Research and Development. Continuing. "Patents From Federally Financed Research and Development," *IDEA, PTC J. Res. & Ed.* 8:199–222, Summer 1964.

Wells, H. B., R. E. Cleland, A. M. Weimer, W. L. Haeberle, Paul Klinge, H. L. Timms, N. W. Raber, and E. W. Martin, Jr. Aerospace Research Applications. Continuing. Weimer and Timms, "Case Report: The Aerospace Research Applications Center," *Business Horizons*, 7: 93–100, Summer 1964. *Aerospace Research Applications Center Operating Manual*, Aug. 1964 (Bloomington: Aerospace Res. Appl. Cent.), 26 pp.

Worcester, D. A., Jr. Oligopoly and Research. Continuing.

Section 3. Scientific and Engineering Manpower; Performance, Education, and Creativity

Bass, H. L. Statistical Study of the Educational Background of Management, With Special Reference to Scientists and Engineers. Continuing.

Boelter, L. M. K. and A. B. Rosenstein. Educational Development Program. Continuing.

Chalupsky, A. B. Productivity Motivation of Scientists and Engineers. Completed. "Incentive Practices as Viewed by Scientists and Managers of Pharmaceutical Laboratories," *Personnel Psychol.* 17:4, Winter 1964.

Cliffe, F. B. and E. S. Uyeki. Science, the Scientist, and the Government. Continuing. Uyeki and Cliffe, "The Federal Scientist-Administrator," *Science* 139:3561, 1267–70, Mar. 1963.

Goldstein, Bernard, Jack Chernick, and B. P. Indik. Adjustment of Engineers to Work Environment. Discontinued.

Hagstrom, W. O. The Scientific Community: A Sociological Analysis. Continuing. "Anomy in Scientific Communities," *Social Problems*, 185–96, Fall 1964, and "Traditional and Modern Forms of Scientific Teamwork," *Admin. Sci. Quart.*, Dec. 1964.

Horowitz, Ira. Regional Distribution of Scientific People. Continuing. "The Regional Distribution of Scientific Talent," *Southern Econ. J.*, Jan. 1965.

Horowitz, M. A. 1962 Salaries and Income of Engineering Teachers. Completed.

Huneryager, S. G. Preliminary Study of Organizational Role Expectations of Leaders (Managers) and Subordinates in Engineering Research Task Groups. Continuing.

Krulee, G. K. and Frank Baker. Studies of Student Values, Curriculum Choice, and Educational Consequences. Continuing. "Engineers at Northwestern," *Northwestern Eng.* 22:2, 20–36 (Evanston: Northwestern Univ., Mar. 1963).

La Porte, T. R. and Howard Vollmer. Science and Management: The Adaptation of Scientists and Managers to Complex Research Organizations. Completed. Vollmer, La Porte, William Pedersen, and Phyllis Langton, *Adaptations of Scientists in Five Organizations: A Comparative Analysis* (Menlo Park, Calif.: Stanford Res. Inst., May 1964).

La Violette, F. E. Work and Achievement: An Analytic Study of the Careers of Electronic Engineers. Temporarily discontinued.

Marcson, Simon. The University Scientist. Continuing.

McIlvaine, W. D., L. M. K. Boelter, and E. P. Coleman. Examination and Analysis of the Educational Needs of Professional Technical Employees. Continuing.

Odiorne, G. S. Campus Recruiting of Engineers. Continuing.

Pelz, Donald and F. M. Andrews. Stimulating and Inhibiting Factors in Scientific Performance. Continuing. "Diversity in Research," *Int. Sci. and Techn.* 21–36, July 1964. Pelz, "Freedom in Research," *Int. Sci. and Techn.* 54–66, Feb. 1964, and "The Creative Years and the Research Environment," *IEEE Trans. Eng. Mgt.* EM-11:1, 23–29, Mar 1964. Andrews, "Time Spent on Technical Work, Teaching, or Administration as Related to Scientific Performance," *Admin. Sci. Quart.* 9:2, 182–93, Sept. 1964.

Price, P. B., C. W. Taylor, J. M. Richards, Jr. and T. L. Jacobsen. Performance Measures of Physicians (Phase I). Completed. Taylor, Price, Richards, and Jacobsen, "An Investigation of the Criterion Problem for a Medical School Faculty," *J Appl. Psychol.*, 1965, and "An Investigation of the Criterion Problem for a Group of General Practitioners," *J. Appl. Psychol.*, 1965. Richards, Taylor, Price, and Jacobsen, "An Investigation of the Criterion Problem for One Group of Medical Specialists," *J. Appl. Psychol.*, 1965.

Price, P. B., C. W. Taylor, and T. L. Jacobsen. Predictors of Physician Performance (Phase II). Continuing.

Reynolds, W. C., Jr. Engineering Manpower Utilization Models. Completed.

Rovetta, C. A., Waino Suojanen, and J. E. Mahoney. Educating Scientific Administrators. Discontinued.

Schein, E. H. Career Development of Researchers. Continuing.

Schill, W. J. Study To Define Curricula Content for Technical Education. Continuing.

Taylor, M. L. Study of Two Agribusiness Careers. Continuing. Taylor and A. R. Jones, Jr., *Rural Life and Urbanized Society* (New York: Oxford Univ. Press, 1964), 493 pp. Taylor and C. W. Glasgow, "Occupation and Low-Income Rural People," *La. Agr. Expt. Sta. Bull.* 90, Dec. 1963. (Baton Rouge: Louisiana State Univ. and Agr. and Mech. Coll.), 40 pp.

WILCOCK, R. C. Evaluation of the Training and Recruitment Problems for Selected Technical Occupations in Short Supply. Continuing, revised; see Franke, W. H. in sec. 8 of this volume.

WILENSKY, H. L. Work, Careers, and Leisure Style: Study of Sources of Social Integration. Continuing. "The Professionalization of Everyone?" *Amer. J. Sociol.* 70:2, 137–58, Sept. 1964.

Section 4. International and Foreign Studies

ALLEN, ROBERT L. Evaluation of the Implications for Trade Policy of Structural Changes in the International Economy. Discontinued.

BASIUK, VICTOR. Technological Change and the Balance of Power. Continuing.

BENNETT, J. W. Habitat, Institutions, and Economic Development in Saskatchewan: Studies in the Cultural Ecology of the Great Plains. Continuing. "Synopsis of a Cultural Ecology Research Program in Saskatchewan," *Plains Anthropologist* 8: 20, May 1963; "Risk and Rationality: Aspects of Behavioral Adaptation in an Arid-Variable Habitat," *Plains Anthropologist* 8:21, 1963; and "Attitudes Toward Animals and Nature in a Great Plains Community," *Plains Anthropologist* 9:23, 37–47, 1964. Bennett and Seena Kohl, "Two Memoranda on Social Organization and Adaptive Selection in Northern Plains Region," *Plains Anthropologist* 8:22, 1963.

BERNSTEIN, H. M. Analysis of the Postwar Growth of the Japanese Photographic Industry. Continuing.

DE ROCHEFORT, NICOLAS. Evaluation of the Role of the Sino-Soviet Bloc Countries in the Development of Scientific and Engineering Manpower Resources of Other Countries. Continuing, revised; see Wekerle, Anton in this volume.

DEWITT, NICHOLAS. Professional Personnel and Scientific Research in the Countries of the Communist Bloc. Completed. Publication pending.

———. Research and Development Establishments in the U.S.S.R. Continuing, revised; see Research and Development in the U.S.S.R. in this volume.

DODGE, NORTON. Utilization and Employment of Women in the Professional Labor Force of the Soviet Union. Completed. Publication pending.

ESTEP, S. D. Doing Nuclear Business Across International Lines. Continuing.

FIELD, M. G. Social Environment of the Soviet Scientist. Continuing.

FOX, R. C. American Sociologist in the Land of Belgian Medical Research. Continuing.

———. Study of Congolese Graduate Physicians. Continuing.

GERSTL, J. E. AND S. P. HUTTON. Education and Careers of Mechanical Engineers in Great Britain. Completed. *Engineers: The Anatomy of a Profession* (London: Tavistock, Ltd., 1965). Gerstl and Lois Cohen, "Dissensus, Situs, and Egocentrism in Occupational Ranking," *Brit. J. Sociol.*, Sept. 1964. Hutton and Gerstl, "Engineering Education and Career Patterns," *Institution of Mechanical Engineers, Proceedings* (London: Inst. Mech. Eng., Mar. 1964), and "The Effects of Background and Training on Success in Engineering," *Charted Mech. Eng.* 11:5, 254–60;282, May 1964.

GLADE, W. P. JR. The Latin American Economies: A Study of Their Institutional Evolution. Continuing.

GRANICK, DAVID. Study of Soviet Economic Development. Completed. Publication pending.

HIGHAM, ROBIN. Production and Politics: A Study of the British Aircraft Industry. Continuing.

KARSH, BERNARD AND S. B. LEVINE. Long-Run Impact of Technological and Organizational Changes on the Nature of Industrial Relations and Structure and Function of the Labor Movement in the United States. Continuing, revised; see Long-Run Impact of Technological and Organizational Changes on the Nature of Industrial Relations and Structure and Function of the Labor Movement in Japan in this volume.

MOSS, L. W. AND S. C. CAPPANNARI. Village Organization in South Italy. Continuing. "Community Research in South Italy," *Ohio Valley Sociologist* 30:1, Sept. 1964.

NEHNEVAJSA, JIRI, S. E. SHIVELY, AND M. D. WALTON. Anticipations of Cold War Futures. Continuing.

NIEBURG, H. L. Military Strategy and Intrapolitics of NATO. Completed. *Nuclear Secrecy and Foreign Policy* (Washington: Public Affairs Press, Feb. 1964), 300 pp.; "Euraton: A Study in Coalition Politics," *World Politics* 15:4, 597–622, July 1963; and "Nuclear Exclusion and the Common Market," *Midwest J. Pol. Sci.* 8:1, 55–74, Feb. 1964.

ORLEANS, LEO. Scientific and Technical Manpower: Inventory of World Resources. Continuing, revised; see Gibbons, W. J., in this volume.

PHILLIPS, WALTER. Educational Systems and the Supply of Scientists and Engineers in Four Countries. Continuing.

POLSON, R. A. Technological Change in the Rural Philippines. Continuing. Polson and A. P. Pal, "Social Changes in the Dumaguete Trade Area, Philippines, 1951–1958," *Cornell Int. Agr. Develop. Mimeo.* 4, Spring 1964 (Ithaca: SUNY, Coll. of Agr. at Cornell Univ.), 106 pp.

SAVAGE, C. H., JR. AND W. G. BENNIS. Human and Organizational Consequences of Two Computer Installations in South America. Continuing.

SOMMERS, L. M. Regional Impact of Technological Developments Upon the Farming-Fishing Economy of Northern Norway. Continuing.

THORELLI, H. B., R. L. GRAVES, AND L. T. HOWELLS. International Operations Simulation (INTOP). Completed. *International Operations Simulation—With Comments on Design and Use of Management Games* (New York: Free Press of Glencoe, 1964), 406 pp.

VAN DORN, H. A. A Decade of Communist Rule in China. Completed. Published (New York: Pageant Press, 1964), 99 pp.

Section 5. Administration, Organization, and Management

ALLEN, T. J., JR. AND D. G. MARQUIS. **Critical Factors in Research Success.** Continuing; see Information Requirements for Research and Development in this volume.

BERTHOLF, W. E., II. **Mineral Resource Socioeconomics.** Continuing. *Some Social and Economic Jurisprudence of Groups* (Socorro: New Mexico Institute of Mining and Technology, 1958), 151 pp., and "Evolution of Values in New Mexico," Cir. 64, New Mexico Inst. of Mining and Techn., Bur. of Mines and Mineral Res., 1962.

DAVIS, G. B. **The Management Science Approach in Accounting: Use of Computer Models in the Analysis and Design of Systems.** Continuing.

DEAN, B. V. **Quantitative Methods in Research Management.** Continuing. "Allocation of Research and Development Resources in U. S. and Israel Industry," *Mgt. Sci.* 11:1, 94–104, Sept. 1964.

FILLEY, A. C. AND R. J. HOUSE. **Some Organizational Determinants of Managerial Behavior.** Continuing; see Some Organizational Correlates of Managerial Behavior in this volume. Filley, "Decisions and Research in Staff Utilization, *Acad. Mgt. J.* 6:220–30, Sept. 1963, and "Common Misconceptions in Business Management," *Bsn. Horizons* 7:3, 87–96, Fall 1964.

FORRESTER, J. W. **Industrial Dynamics.** Continuing. Published (Cambridge: M.I.T. Press, and New York: Wiley, 1961), 464 pp., and "Common Foundations Underlying Engineering and Management," *IEEE Spectrum* 1:9, Sept. 1964, 12 pp.

GATES, J. E. **The Management of Creativity.** Continuing.

GORDON, GERALD, SUE MARQUIS, AND O. W. ANDERSON. **Organizational Setting and Scientific Accomplishment.** Continuing. Gordon, "The Problem of Assessing Scientific Accomplishment: A Potential Solution," *IEEE Trans. Eng. Mgt.* EM–10:4, Dec. 1963, and "Needed Research on the Social-Psychological Aspects of Disease," *Amer. Rev. Resp. Dis.*, May 1964. Gordon and S. W. Becker, "Changes in Medical Practice Bring Shifts in the Patterns of Power," *Mod. Hosp.*, Feb. 1964.

KARGER, D. W. AND R. G. MURDICK. **Managing Engineering and Research.** Completed. Published (New York: Indust. Press, 1963), 693 pp.

KARSH, BERNARD AND JACK SIEGMAN. **Work and Organizational Correlates of Technological Change.** Continuing. "Functions of Ignorance in Introducing Automation," *Social Probl.*, Fall 1964.

LESHER, R. L. **Evaluation of the Role of Independent, Nonuniversity, Nonprofit Research Institutions With Special Attention to Midwestern United States.** Completed under new title: Independent Research Institutions and the Industrial Applications of Aerospace Research.

MAFFEI, R. B. **Laboratory Managment and Effectiveness.** Temporarily discontinued.

MAFFEI, R. B. **Laboratory Management and Effectiveness.** Temporarily dis- Continuing; see Marquis, D. G. in this volume.

MANN, F. C., F. W. NEFF, AND L. K. WILLIAMS. **Plant Life Cycle, Management Climate, and Worker Satisfactions.** Temporarily discontinued.

MARCSON, SIMON. **The Engineering Manager.** Continuing.

———. **Policies and Practices of Research Management in Industry.** Continuing.

Marquis, D. G. and collaborators. **Organization Research Program.** Continuing.

McMillan, Claude. **Study of Private Business Alliances for the International Transfer of Technological and Managerial Knowledge and Skills.** Temporarily discontinued.

Roberts, E. B. **General Model of R&D Organization Effectiveness.** Continuing, revised; see Model of Laboratory Effectiveness in this volume. *Dynamics of Research and Development* (New York: Harper & Row, 1964), and "Research and Development Policy-Making," *Technol. Rev.* 46:8, 32–36, June 1964.

Rubenstein, A. H. **Birth and Death of Industrial Operations Research Groups.** Continuing; see Life Histories of Operations Research Management Science Group in this volume.

———. **Development of New Technical Skills.** Continuing.

Rudelius, C. W. **A Computer Model of a Firm Doing Government-Sponsored Research and Development of Military and Aerospace Systems.** Completed.

Stekler, H. O. **Economic Impact of the Aerospace Industry.** Completed. *Structure and Performance of Aerospace Industry* (Berkeley: Uni. of Calif. Press, 1965), 250 pp.

Udy, S. H., Jr. **Technology and Administrative Structure in Industry.** Continuing.

Whisler, T. L. **Computer Technology and the Structure of Organization.** Continuing.

Section 6. Sociology and Psychology

Bowers, R. V., R. G. Brown, C. D. Bryant, and J. L. Miller. **Impact of Technological Change on Careers in Large-Scale Organizations: A Basic Study in the Sociology of Occupations.** Continuing.

Coe, R. M. and A. F. Wessen. **Acceptance of an Innovation.** Continuing.

De Grazia, Alfred. **Social Invention.** Continuing.

Guest, R. H. **Socio-Technical Systems.** Continuing.

Hamilton, C. H., W. N. Reynolds, and S. C. Mayo. **Social and Economic Significance of Recent Population Trends in North Carolina.** Continuing. Hamilton, "The Negro Leaves the South," *Demography* 1:1, 273–95, 1964, and "North Carolina Abridged Life Tables," *N.C. Agr. Expt Sta. Progr. Rep.* RS–44, Sept. 1964 (Raleigh: North Carolina State of the Univ. of North Carolina), 24 pp.

Hoyt, E. E. **General Theory of Culture Change Among Underdeveloped Peoples Under the Impact of Modern Technology.** Continuing.

Hoyt, E. E. and E. M. Shepherd. **Economic-Cultural Adjustment of American Indians With Special Reference to One Group of Tama, Iowa.** Continuing.

KRANZBERG, MELVIN. The Technological Revolution and Social Reform. Completed. In *34th Annual Yearbook of the National Council of Social Studies*, Shirley Engle, ed., Fall 1964.

LABOVITZ, S. I. Technology and Division of Labor. Completed. Labovitz and J. P. Gibbs, "Urbanization, Technology, and the Division of Labor: Further Evidence," *Pacific Sociol. Rev.* 7:1, 3–10, Spring 1964.

LANG, G. O., M. B. LANG, CHARLES NOBLE, AND WARREN ROTH. Social and Cultural Change in Sukumaland, Tanganyika. Continuing. Lang and Lang, "Problems of Social and Economic Change in Sukumaland, Tanganyika," *Anthropol. Quart.* 35:2, 86–101, 1962.

LARSEN, O. N. AND J. B. TAYLOR. Science on Display: A Study of the United States Science Exhibit at the Seattle World's Fair, 1962. Completed. Publications pending.

LENTZ, O. H. Science and the Radical Trends of Social and Cultural Integration. Discontinued.

LONEGRAN, WALLACE, RICHARD RENCK, AND MONTAGUE BROWN. Attitude Surveys for Patients and Hospital Personnel. Continuing.

MARCSON, SIMON. Utilization of Social Science Research in Industry Completed.

MEEHAN, E. J. Influence of Science on Methodology of Social Science. Completed under new title, Scientific Political Science: A Study of Methodology.

———. Science and Social Values. Continuing.

PERRY, S. E. Science, Psychiatry, and the American Society: A Study in the Social Integration and Insulation of Scientific Ideas. Continuing.

SAYRE, W. S. The Interest-Group Environment of Federal Scientific Bureaus. Completed. Publication pending.

STORER, N. W. Continuing Theoretical Analysis of the Social System of Science. Continuing. "The Coming Changes in American Science," *Science* 142:3591, 464–67, Oct. 25, 1963, and "Basic *versus* Applied Research: The Conflict Between Means and Ends in Science," *Indian Sociol. Bull.* 2:1, Oct. 1964.

TRUDEAU, JOHN, ELLIOTT LIEBOW, AND HARRIET LIEBOW. Culture Change Among the Cree Indians of Winisk, Ontario, Canada. Continuing. Chance, Norman and Trudeau, "Social Organization, Acculturation, and Integration Among the Eskimo and the Cree: A Comparative Study," *Anthropologica* 5:1, 47–56, Ottawa, 1963.

VAN DYKE, VERNON. Pride and Power: The Rationale of the Space Program. Completed. Published (Urbana: Univ. of Illinois Press, 1964.)

WEBBER, L. E., F. H. BUMFORD, JOSEPH SEIBERLICH, C. L. GRANT, W. M. BEASLEY, OWEN DURGIN, AND SAM ROSEN. Methods of Evaluation of Cost of Air Pollution. Continuing; see sec. 6 in this volume.

ZUCKERMAN, H. A. AND R. K. MERTON. Patterns of Collaboration in Science: Studies in the Sociology of Science. Continuing.

Section 7. Impacts on Selected Industries

AMES, EDWARD. **Technological Change in the Telephone Industry.** Continuing.

BACON, F. R., JR., C. E. CHASTAIN, L. V. COLWELL, M. G. DEVRIES, WILLIAM DRAKE, H. W. FARRIS, W. W. GARDNER, AND ALFRED SCHMIDT. **Study of Michigan Machine Tool and Electronics Industries.** Completed; for new study based on this research see Wilson, C. C. in this volume. *Proceedings of the Conference on Production Research Abroad*, Sept. 16–17, 1963, 327 pp.; *Anatomy of an Industry: A Summary of Findings and Conclusions from a Study of the Michigan Machine Tool Industry in Its National and International Setting*, 18 pp.; and *Anatomy of an Industry: A Study of the Michigan Machine Tool Industry in Its National and International Setting*, 105 pp. (Ann Arbor: Univ. of Michigan, 1963). Chastain, "Machine Tools," *Michigan Econ. Record* 6:3, 1–2, Mar. 1964. *Proceedings of the Michigan Machine Tool Conference*, Mar. 28–29, 1962, Chastain, ed. (Ann Arbor: Univ. of Michigan). Schmidt, *Observations on Western European Machine Tool Research* (Ann Arbor: Univ. of Michigan, 1963), 29 pp. Schmidt, Bacon, and Wilson, "Machine Tool Research Here and Abroad," *Mechanical Engineering* 86:6, 25–30, June 1964. De Vries, "The Dynamic Effects of Planning Horizons on the Selection of Optimal Product Strategies," *Mgt. Sci.* 10:3, 524–44, Apr. 1964.

BUTZ, W. T. AND C. W. PIERCE. **Effect of Technology on the Physical and Financial Organization of Individual Firms in the Market Milk Industry.** Discontinued. See new project in this volume. Pierce, Butz, and R. Knutson. "Basis for Resale Price Differentials in the York Marketing Area," *Agri. Econ. Res. Ser.* 45, Pa. Agr. Expt. Sta. (University Park: Pennsylvania State Univ., Nov. 1963), 65 pp.

COTTRELL, W. F. **Impact of Technological Change on Railway Workers in the United States.** Continuing. See Impact of Technological Change on Railway Workers in the United States, Britain, and New Zealand in this volume.

COUPE, J. D. **Impact of the Space Program on the Rubber Industry.** Continuing.

COWAN, D. R. G. **Growth Requirements of the Steel Industry.** Continuing.

DAHL, R. P. AND J. D. HYSLOP. **Economic Analysis of the Impact of Changes in Transportation Technology and the Railroad Rate Structure on Grain Marketing in Minnesota.** Completed. Hyslop and Dahl, "The Effect of Changes in Transportation Costs on Minnesota Wheat Flour Millers and Oilseed Processors," *Minn. Agr. Expt. Sta. Bull.* 472, 1964 (St. Paul: Univ. of Minnesota), 28 pp.

FOGEL, W. A. **Technological Change and the Work Force in Retail Trade.** Continuing.

FULLER, C. E. **Transportation of Grain and Grain Products in Tennessee.** Completed.

HANDBERG, R. B. **"Mañana" for the Railroads?** Completed.

HEATH, M. S. **Business Integration in the Textile Industry, 1936–58.** Continuing.

HOMAN, P. T. and W. F. LOVEJOY. **Economic Impact of State Petroleum Conservation Regulation.** Continuing. Lovejoy, "What Are the Prospects for Lower Oil-Production Costs?" *Oil and Gas J.* 102–107, Sept. 14, 1964, and "Oil Conservation in a New Setting," *Natural Resources J.* 4:2, October 1964.

———. **Economic Significance of Petroleum Reserve Data.** Completed.

Kramer, H. M. Economic Impact of the Aircraft, Missiles, and Electronics Industries in the United States, 1950–61. Continuing.

Kranzberg, Melvin. Social Impact of Transportation Technology: Some Lessons of History. Completed. *The Flight Forum* (Proceedings). (Hartford: Connecticut General Insurance Co., 1963.)

Latham, J. P. Description of the Distribution of World Telecommunication Services. Completed.

Lovejoy, W. F. Impact of Technology and Government Regulation on the Telecommunications Industry. Temporarily discontinued.

Miller, E. W. Evolution of the Economy of the Appalachian Coal Region. Continuing.

Rosse, J. N. Impact of Technological Change and Economies of Scale on the Structure of the American Daily Newspaper Industry. Continuing.

Sampson, R. J. Transportation as a Factor in Regional Development. Continuing. "Railroad Shipments and Rates into the Pacific Northwest," (Eugene: Bur. of Econ. and Bus. Res., Univ. of Oregon, 1963), 46 pp. "Changes in Oregon's Ocean-Borne Commerce, 1954–61," *Oregon Bus. Rev.* 22:7, 1–4, July 1963, and "Industries that Provide the Growth Base Through our Comparative Advantage in the Pacific Northwest." *Proceedings, Industrial and Economic Development Conference,* Bur. of Econ. and Bus. Res. Fifth Annual Conference, 1–7, (Pullman: Washington State Univ., 1963.)

Steele, H. B. Economic Potentialities of Synthetic Liquid Fuels from Oil Shales. Completed. "The Prospects for the Development of a Shale Oil Industry," *Western Econ. J.* 1:3, 62–86, Fall 1963, and "Patent Restrictions and Price Competition in the Ethical Drugs Industry," *J. of Indus. Econ.* 13:3, 98–124, July 1964.

Welles, J. G. and C. H. Prien. Oil Shale: Economic Implications of a New Industry. Continuing. Prien, "Current Status of U.S. Oil Shale Technology," *Industrial and Engineering Chemistry* 56:9, 32–40, September 1964.

Section 8. History and Philosophy of Science and Technology

Berman, Alex. Science and French Pharmacy: 1800-1873. Continuing. "Conflict and Anomaly in the Scientific Orientation of French Pharmacy: 1800–1873," *Bull. Hist. Med.* 37:5, 440–62, Sept.-Oct. 1963.

Cohen, R. S. and collaborators. Studies in the Relations of the History of Science and the Philosophy of Science. Continuing.

Driscoll, G. R. Lessons From the Past: What the Modern World Can Learn From the History of Science. Continuing.

DuBoff, R. B. Electric Power in American Manufacturing, 1889–1958. Completed. "A Note on the Substitution of Inanimate for Animal Power," *J. Pol. Econ.* 72:2, 195–96, Apr. 1964.

Dupree, A. H. Studies in the History of Science in the Federal Government, 1940–60. Continuing.

Fishbaugh, C. P. Howard Shipyards of Jeffersonville, Indiana: An Economic History. Completed.

Hill, B. H., Jr. Impact of Scientific Ideas on Medieval Thought. Continuing; see Impact of Medical Ideas on Medieval Thought in Sec. 3 of this volume. MacKenney, L. C. and Hill, "A New Funfbilderserie Manuscript—Vatican Palat. Lat. 1110," *Sudhoffs Archiv fur Geschichte der Medizin und der Naturwissenschaften* (Wiesbaden, Germany), 48:3, Oct. 1964, 8 pp.

Kranzberg, Melvin. Industrial Revolutions. Continuing.

———. Notes on Technological Developments of the 19th Cenutry. Completed. Publication pending.

Lane, F. C. Effects of Changes in Nautical and Military Technology on the Status of Seamen, 1200–1700. Continuing.

Mehan, E. J. Science, Ethics, and Politics. Discontinued.

Merton, R. K. Behavior of Scientists: Studies in the Sociology of Science. Continuing. "The Ambivalence of Scientists," *Revista de Occidente* (Spain), Jan. 1964, and "Resistance to the Systematic Study of Multiple Discoveries in Science," *European J. of Sociol.* 4: 237–82, 1963.

Moore, J. P. Antonio de Ulloa: Scientist and Colonial Administrator. Continuing.

Price, D. J. de Solla. Historical and Statistical Studies of Science, Technology, and Medicine. Continuing. "The Science of Science," *The Science of Science*, 195–208, M. Goldsmith and A. Mackay, eds. (London and Toronto: Souvenir Press, 1961).

Rice, P. M. History of Engineers in the United States. Continuing. "The American Engineer," *Acts of the 10th International Congress of the History of Science* 10, 375–79, Fall 1964.

Sarell, Moshe. Levels and Variations of Productivity in 19th-Century Physical Science: Their Measurement and Some of Their Socioeconomic Correlates. Completed.

Schilling, W. R. *Admirals and Foreign Policy.* Continuing.

Sharlin, H. I. History of Science in the Nineteenth Century. Continuing.

Spengler, J. J. History of Economic Ideas in Asia, the Middle East, and Europe Before 1700. Continuing.

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Section 9. Automation and Impacts on Labor

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Cordell, J. W. Arbitration of Seniority Disputes: Standards and Decision Patterns. Completed.

Dankert, C. E. Automation and Hours of Work. Discontinued.

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Foltman, F. F. Training and Retraining Problems Related to Automation. Continuing.

Hardin, Einar. Job Satisfaction and the Desire for Change. Completed. *J. Appl. Psychol.*, June 1965, and "Perceived and Actual Change in Job Satisfaction," *J. Appl. Psychol.*, June 1965.

Harms, L. T. and Rosella James. Development of Labor Force Employment and Unemployment Data for the 67 Counties of Pennsylvania. Continuing.

Harms, L. T. and A. J. D. Cook. Development and Testing of Predictors of the Impact of Changes in Technology on Employment and Unemploymen. Discontinued.

Jaffee, A. J. Study of the Impact of Technological Change on the Total Labor Force. Continuing.

Jakubauskas, E. B. Occupational Mobility of White-Collar Workers Related to Office Automation. Completed. Publication pending.

Killingsworth, C. C. Automation and Employment. Continuing; see Structural Changes in the Economy and Employment in sec. 12 of this volume. "Automation, Jabs, and Manpower," Subcommittee on Employment and Manpower, Hearings on Nation's Manpower Revolution, vol. 5, U.S. Senate, 1963, and "Structural Unemployment in the United States," *Proceedings, International Labour Conference*, July 1964, Geneva. (New York: MacMillan Co., 1965).

Mangum, G. L. The Subsequent Employment Experience of 800 Plant Employees on Layoff From a Steel Plant. Discontinued.

Mann, F. C. and F. W. Neff. Technological Obsolescence and Mental Health: A Study in Six Power Plants. Temporarily discontinued.

Mann, F. C. and L. K. Williams. Technological Change and Mental Health: A Study of the Impact of EDP on the Office. Temporarily discontinued.

Weiskopf, W. J. Federal and State Worker Retraining and Skill Development Programs. Discontinued.

Wilcock, R. C. and W. H. Franke. Long-Term Labor Force Adjustment and Sources of Income of Displaced Workers. Continuing, revised; see Franke, W. H. in sec. 12 of this volume.

Wilpuetz, Robert. Effects of Automation on Employee Morale and Productivity in a Bank: A Case Study. Continuing.

Young, J. E. Development of Methodology for the Study of Employment Effects of Automation in Selected Arizona Industries. Continuing.

Section 10. Patents and Trademarks

Bangs, R. B. and J. F. Creed. Tax Problems Connected With Patents and Related Industrial Property. Continuing.

Federico, P. J. Foreign Patent Statistics. Continuing. "Historical Patent Statistics," *J. Patent Office Soc.* 46:2, 89-171, Feb. 1964.

Frost, G. E. and S. C. Oppenheim. Effects of Certain Antitrust Decrees Involving Patents as a Major Factor. Temporarily discontinued.

Harris, L. J. and I. H. Siegel. Positive Competition. Continuing.

———. Role of Industrial and Intellectual Property in Latin America. Continuing.

Larsen, Jack. Legal Problems of Ownership of Inventions as Property. Discontinued.

Machlup, Fritz. Economic Aspects of Patents. Completed. Publication pending.

Machlup, Fritz and collaborators. Economic Aspects of Patent Protection, Technological Inventions, and Their Development. Continuing. Dernburg, T. F., "The Quality of Invention: An Economic Interpretation," *Nebr. J. Econ. and Bsn.* 3:2, 16–28, Autumn 1964. Stoikov, Vladimir, "The Allocation of Scientific Effort: Some Important Aspects, *Quart. J. Econ.* 78, 307-23, May 1964. Machlup, "Die Produktivitat der naturwissen schaftlichen and technischen Forschung und Entwicklung," *Arbeitsgeneinschaft fur Forschung des Landes Nordrhein-Westfalen* 122, 37–64, 68–70, 1963. R. E. Miller, "Capital Costs in Air Transportation," *J. Industr. Econ.* 12:3, 236–49, July 1964.

Markham, J. W. and Charles Mansfield. Role of Patents in Executive Decisions. Completed. Mansfield, "The Riskiness of Research and Development Performed by Large Firms," *PTC J. Res. & Ed.* 7:4, 461–73, Winter 1963–64.

Mosel, J. N. Standards for Determining Trademark Distinctiveness. Continuing.

Rossman, Joseph. Nature and Role of Invention and Inventors in Contemporary Society. Continuing. "Rewards and Incentives to Employee-Inventors," *PTC J. Res. & Ed.* 7:4, 431–60, Winter 1963–64.

Sanders, B. S. Sources, Uses, and Values of Patented Inventions. Continuing. "What Should the Federal Government's Patent Policy Be?" *IDEA, PTC J. Res. & Ed.*, 8:2, 168–98, Summer 1964, and "Patterns of Commercial Exploitation of Patented Inventions by large and Small Corporations," *IDEA, PTC J. Res. & Ed.*, 8:1, 51–92, Spring 1964.

Siegel, I. H. Analysis of Published Company Information on Research and Industrial Property. Continuing.

———. Individual and Joint Invention. Continuing. "Dominance of Sole Patentees in Computer-Related Technology," *IDEA, PTC J. Res. & Ed.*, 8:1, Spring 1964.

Siegel, I. H. and Edgar Weinberg. Role of Patents in the Evolution of Established Firms. Continuing.

Siegel, I. H. and collaborators. Role of Patents in the Creation, Development, and Operations of Small Industrial Firms. Continuing.

Schmookler, Jacob. Determinants of Inventive Activity. Continuing. "Invention, Innovation, and Business Cycles," *Variability of Private Investment* Pt. II, Joint Economic Committee, U. S. Congress, Jan. 1962. (Washington: U. S. Government Printing Office). Schmookler and O. H. Brownlee, "Determinants of Inventive Activity," *Amer. Econ. Rev.*, May 1962. Griliches, Zvi and Schmookler, "Inventing and Maximizing," *Amer. Econ. Rev.*, Sept. 1963.

Weiser, G. J. Role of Industrial and Intellectual Property in the European Economic Community. Continuing. "Patent and Antitrust Developments and Prospects of the European Economic Community," *IDEA, PTC J. Res. & Ed.*, 8:1, Spring 1964.

Section 11. Innovation, Including Impacts on Specific Inventions and New Processes

Balintfy, J. L. and A. M. Goldman. **Experiments With Computerized Diagnostic Processes.** Completed. Rogers, C. A., Balintfy, and Goldman, "Computers, Physicians, and the Diagnostic Decision-Making Process," *Human Factors* 6:5, Nov. 1964.

Bock, R. H., D. P. Jacobs, and G. R. Whitaker, Jr. **Study of the Impact of the Computer Upon Corporate Inventory Holdings Since 1950.** Completed. "Computer Use in Large Companies," *Data Processing*, 15–18, Oct. 1963.

Donat, E. R. **Information Technology and the Managerial Heirarchy.** Continuing.

Estep, S. D. **Mass Media of Communications and Manipulation. The Mass Mind, With Emphasis on Space Communications Satellites.** Continuing. "Some International Aspects of Communications Satellite Systems," *Northwestern University Law Rev.* 58:2, 237–65, May-June 1963 (Evanston: Northwestern Univ.). "The International Lawmakers in a Technological World: Nuclear Energy and Space Communications," *George Washington Univ. Law Rev.* 33:1, 162–81, Oct. 1964. (Washington: George Washington Univ.). Estep and A. L. Kearse, "Space Communications and the Law: Adequate International Control After 1963?" *Michigan Law Rev.* 60:7, 873–904, May 1962 (Ann Arbor: Univ. of Michigan).

Estep, S. D., E. H. Forgotson, and W. E. Meyer. **Radiation Exposures and Their Legal Impact.** Continuing. Estep and W. R Allan, "Radiation Injuries and Time Limitations in Workmen's Compensation Cases," *Univ. of Michigan Law Rev.* 62:2, 259–308, Dec. 1963, and Estep and T. W. Van Dyke, "Radiation Injuries: Statute of Limitations Inadequacies in Tort Cases," *Univ. of Michigan Law Rev.* 62:5, 753–94, Mar. 1964 (Ann Arbor: Univ. of Michigan).

Gold, Bela. **Effects of Technological Innovations in the Steel-Producing and Steel-Using Industries on Natural Resource Requirements.** Continuing.

Horne, W. J. **Entrepreneurial Aspects of High-Speed Computing.** Continuing.

Hyatt, Stephen, Johannes Delphendahl, and F. E. Montville. **Impact of a Space Facility on a Small Community: A Case Study of Andover, Maine.** Continuing.

Karger, D. W. and A. B. Jack. **Problems of Small Business in Developing and Exploiting New Products.** Completed. Published (Troy: Rensselaer Polytechnic Institute, School of Management, Nov. 1963), 252 pp.

Kenney, J. P. **Feasibility Study of State-Wide Law Enforcement Information Systems.** Completed.

Littauer, David, A. F. Wessen, and Jay Goldman. **Sterile Disposable Nurser System: An Evaluative Study.** Completed. Monogr. 2 (St. Louis: Med. Care Res. Ctr.).

Peach, W. N. **Economic Study on 564 Counties of the States of Arkansas, Iowa, Kansas, Missouri, Nebraska, and Oklahoma.** Continuing.

Rosenberg, Nathan. **Technological Change in American Capital Goods Industries, 1840–1910.** Completed. "Technological Change in the Machine Tool Industry, 1840–1910," *J. Econ. Hist.*, Dec. 1963.

Stevens, J. R. **Study of Administrative Uses of Computers for Instructional Cost Analysis in Colleges and Universities of the United States.** Continuing.

Warrick, W. H. Response of the Investor-Owned Electric Utilities to the Development of Atomic Energy for Electrical Power Generation. Completed.

Yoshino, I. R., James Perry, and R. W. Heath. Study of the Effects of Automated Information Retrieval on University Students. Completed.

Zimmerman, J. F. Zoning and Atomic Energy. Completed. "Zoning for Atomic Energy Uses," *Zoning Dig.* 16:7, 161–169, July 1964.

Section 12. Public Policy, Government, and National Defense

Benoit, Emile. Relation of the International Economy to Disarmament and Arms Control. Continuing.

Chastain, C. E. and F. R. Bacon, Jr. Analysis of a Tax Incentive To Stimulate Research and Development. Discontinued. Bacon and Chastain, *Analysis of a Tax Incentive To Stimulate Product Development in Michigan* (Ann Arbor: Inst. of Sci. and Tech., The Univ. of Michigan, Dec. 1961), 16 pp.

Clark, J. J. Defense Expenditures and Research and Development. Continuing; see The New Economics of National Defense in sec. 6 of this volume.

Crafton, L. J. Defense Business in Michigan. Continuing. "Michigan's Stake in Aerospace," *The Michigan Yearbook*, 1963, vol. 5 (Detroit: Democratic Bsn. and Prof. Comm. of Michigan, Dec. 1963).

Kash, D. E. International Cooperation in Space: The American Experience. Continuing.

Nieburg, H. L. Technology and Diplomacy. Continuing. "Atoms-for-Peace: A Hope Deferred," *Bull Atomic Scientists* 20:1, 35–40, Jan. 1964. "John F. Kennedy and the Revival of Diplomacy," *Int. Rev.* 1:1, 1–12, June 1964, and "The IAEA: A Critical Appraisal," *Yearbook 1965* (London: London Institute of World Affairs, Jan. 1965), 30 pp.

Penick, J. L., Jr., C. W. Pursell, Jr., M. B. Sherwood, and D. C. Swain. Readings in Science and Public Policy, 1940–60. Continuing.

Pursell, C. W., Jr. Science and Government in the Great Depression, 1929–39. Continuing.

Roberts, E. B. R&D Contracting System. Continuing, revised; see Research and Development Contracting System in sec. 6 of this volume.

Schilling, W. R. The H-Bomb Decision. Continuing. "Weapons, Doctrine, and Arms Control: A Case From the Good Old Days," *J. Conflict Resolution* 7: 3, 192–214, Sept. 1963.

Singer, J. D. and Hirohide Hinomoto. Computer Simulation of a Disarmament Inspection System. Completed. Publication pending.

Swain, D. C. Federal Government and Natural Resources, 1933–60. Continuing.

Section 13. Economic Development

BENOIT, EMILE. International Economic Adjustments to Disarmament and Arms Control. Continuing.

CAPLOW, THEODORE AND KURT FINSTERBUSCH. Patterns of Economic and Social Development in the Modern World. Continuing.

EDGEL, R. L., S. O. PARK, WILLIAM MCDANIELS, AND A. D. SANDOVAL. Economic Development of New Mexico Since Statehood. Continuing, revised (three projects); see Blumenfeld, A. A. and Edgel, Economic Development of New Mexico Since Statehood: Economic Base Study of New Mexico—Part I (also Blumenfeld, and Blumenfeld and Edgel, parts II and III, in sec. 2 of this volume).

HOFMEISTER, R. H. Cost Analysis of Electricity Supply Systems for Underdeveloped Rural Communities. Completed.

JACOBS, N. G. Underdevelopment Reconsidered: An Institutional Sociological Case Study of Iran. Continuing. "The Social Basis of Capitalism: the Case of Iran," *Transactions of the Fifth World Congress of Sociology* vol. 4, 1963, and "La Religion et le Developpement Economique: Le cas de l'Iran," *Archives de Sociologie des Religions*, No. 15, 43–48, 1963.

MEIER, R. L. Development Planning. Completed. Publication pending.

MUNGER, EDWIN. Economic Development of Southern Africa. Completed. *Bechuanaland: Pan African Outpost or Bantu Homeland?* (London: Oxford Univ. Press, 1964).

RUBENSTEIN, A. H. AND E. C. YOUNG. Organization of Applied Research in Smaller and Developing Countries. Continuing.

STRASSMAN, W. P. Factor Proportions, Technological Change, and Industrialization in Underdeveloped Countries. Continuing.

Section 14. Decision-Making

GRIFFITHS, J. C., J. J. SCHANZ, JR., AND J. F. MCDIVITT. Operations Research in Mineral Resource Development. Continuing. Griffiths, *Frequency Distributions of Some Natural Resource Materials*, 23rd Tech. Conf. on Petroleum Production, Cir. 63, 174–98, 1962; *Uses of Computers and Statistics in Exploration and Development of Mineral Resources*, Coll. of Mines, vol. 1, 1962 (Tucson: Univ. of Arizona); "Statistical Approach to the Study of Potential Oil Reservoir Sandstones," *Computers in the Mineral Industries*, Pt. 2, Proc. of Third Annual Conf., June 24–29, 1963, 9: 2, 637–68, 1963 (Stanford: Stanford Univ.); and *Exploration for Natural Resources*, Jt. Mtg. Inst. of Mgt. Sci. and Oper. Res. Soc. of Amer., Minneapolis, 12: 2, B–180, 1964. Griffiths and L. J. Drew, *Simulation of Exploration Programs for Natural Resources by Models*, Bull. Colorado School of Mines, 1964 (Golden: Colorado School of Mines). Modarresi, H. G. and Griffiths, *Relationship Between Reservoir Properties and Petrography of First Venango Sand*, 24th Tech. Conf. on Petroleum Prod., Cir. 66, 251–66, 1963.

Hamberg, Daniel. Statistical Analysis of R&D Expenditures. Continuing. "Size of Firm, Oligopoly, and Research: The Evidence," *Canadian J. Econ. and Pol. Sci.* 30: 1, 62–75, Feb. 1964.

Lovejoy, F. A. Research and Development Project Abandonment Decision. Continuing.

Rubenstein, A. H., R. C. Hannenberg, Louis Goldberg, and William Pound. A Decision-Making Study of Idea Generation and Project Selection in Industrial Research and Development. Continuing.

Summer, C. E., E. K. Warren, and J. J. O'Connell. Science and Philosophy in Policy Decisions. Completed. Summer and O'Connell, *The Managerial Mind* (Homewood, Ill.: Richard D. Irwin, 1964), 757 pp.

Williams, L. K. Impact of Automation on Management Decision-Making and on Job Structure. Continuing. "The Human Side of a Systems Change," *Systems and Procedures J.* 40–43, July-Aug. 1964. Williams and C. B. Williams, "The Impact of Numerically Controlled Equipment on the Factory Organization," *California Mgt. Rev.*, Nov. 1964.

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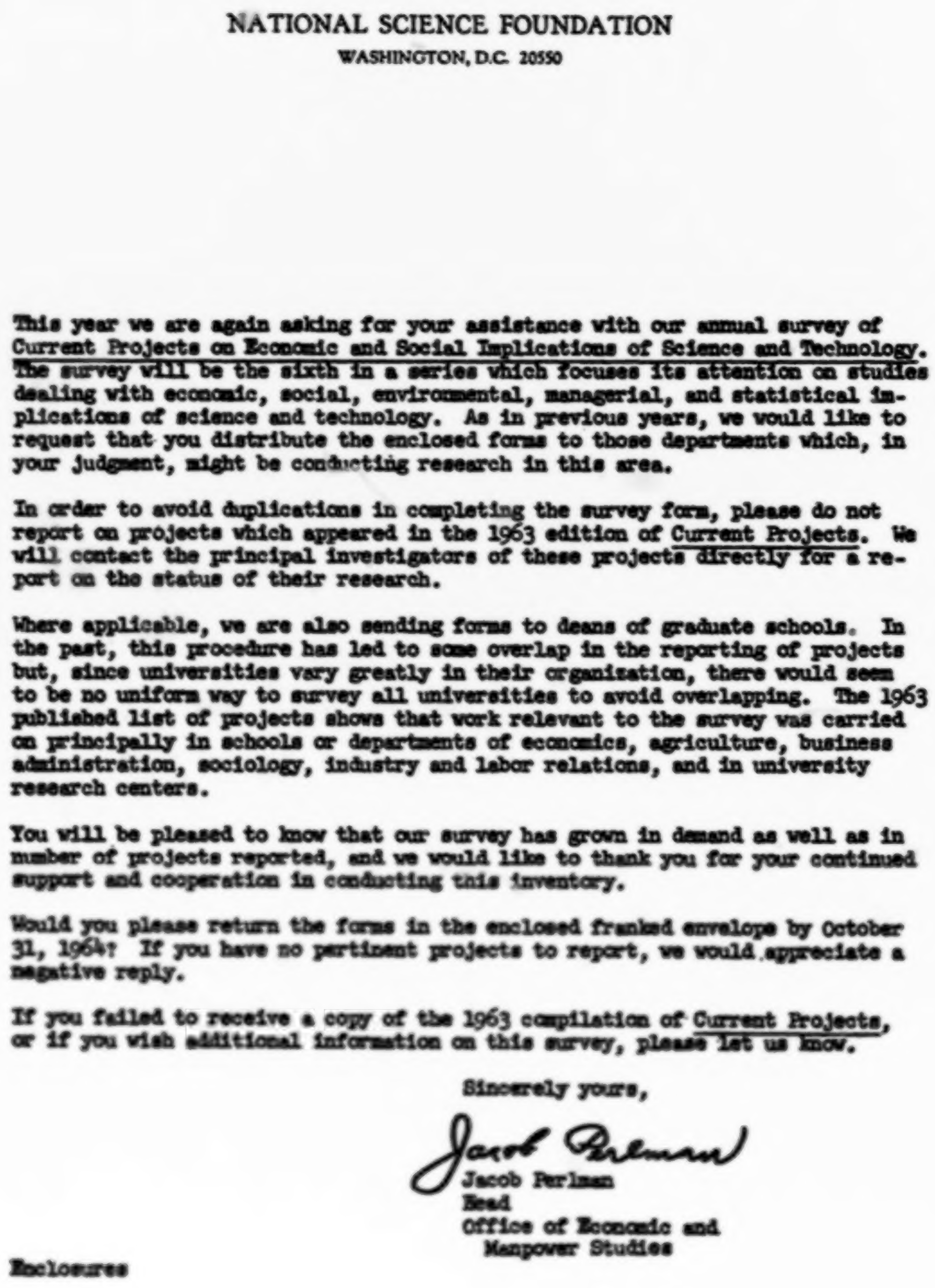
APPENDIX F

Letter of Transmittal and Questionnaire Form



NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

This year we are again asking for your assistance with our annual survey of Current Projects on Economic and Social Implications of Science and Technology. The survey will be the sixth in a series which focuses its attention on studies dealing with economic, social, environmental, managerial, and statistical implications of science and technology. As in previous years, we would like to request that you distribute the enclosed forms to those departments which, in your judgment, might be conducting research in this area.

In order to avoid duplications in completing the survey form, please do not report on projects which appeared in the 1963 edition of Current Projects. We will contact the principal investigators of these projects directly for a report on the status of their research.

Where applicable, we are also sending forms to deans of graduate schools. In the past, this procedure has led to some overlap in the reporting of projects but, since universities vary greatly in their organization, there would seem to be no uniform way to survey all universities to avoid overlapping. The 1963 published list of projects shows that work relevant to the survey was carried on principally in schools or departments of economics, agriculture, business administration, sociology, industry and labor relations, and in university research centers.

You will be pleased to know that our survey has grown in demand as well as in number of projects reported, and we would like to thank you for your continued support and cooperation in conducting this inventory.

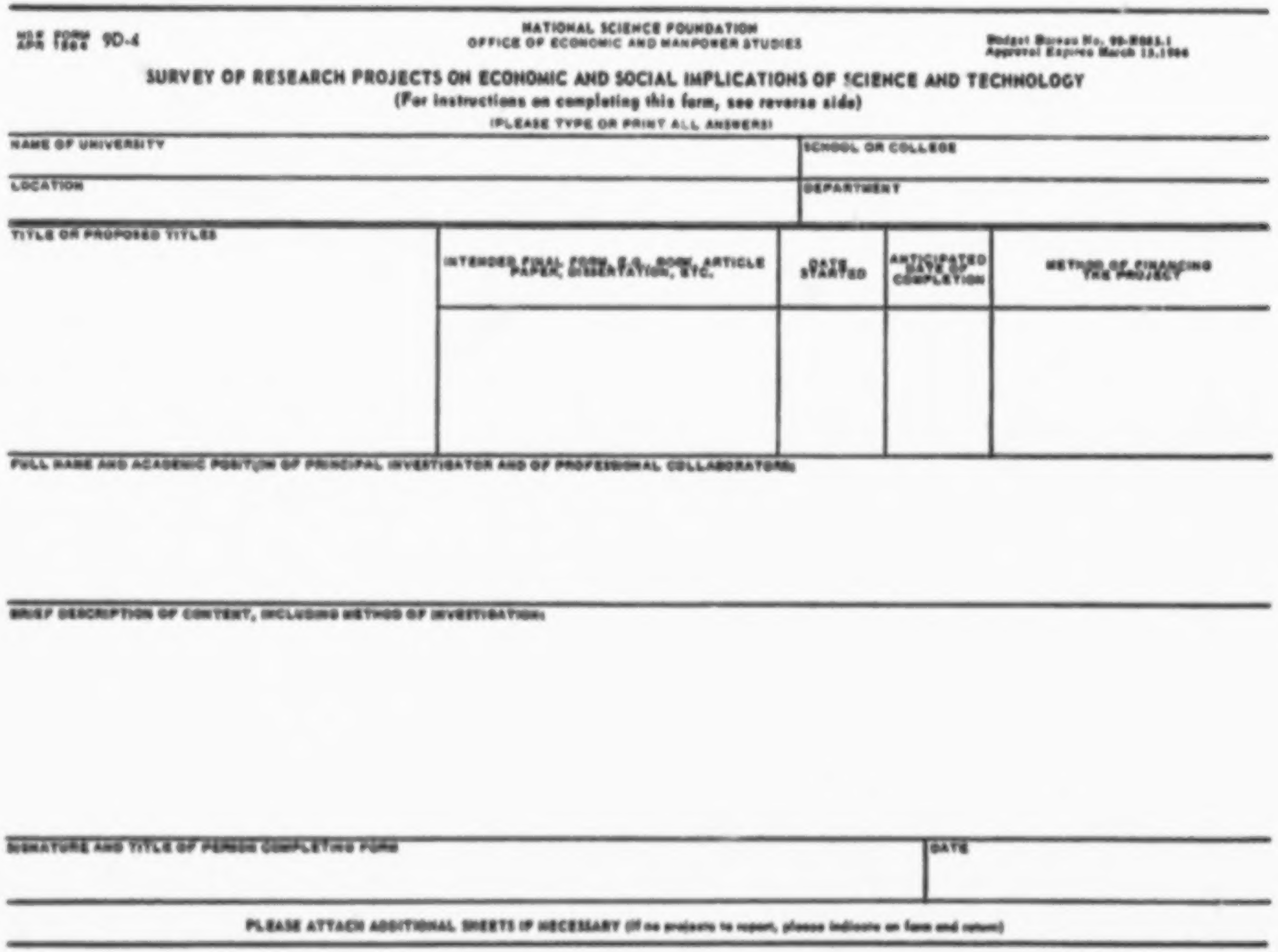
Would you please return the forms in the enclosed franked envelope by October 31, 1964? If you have no pertinent projects to report, we would appreciate a negative reply.

If you failed to receive a copy of the 1963 compilation of Current Projects, or if you wish additional information on this survey, please let us know.

Sincerely yours,

Jacob Perlman
Jacob Perlman
Head
Office of Economic and
Manpower Studies

Enclosures



NSF FORM 9D-4
APR 1964

NATIONAL SCIENCE FOUNDATION
OFFICE OF ECONOMIC AND MANPOWER STUDIES

Budget Bureau No. 99-R083.1
Approval Expires March 15,1966

SURVEY OF RESEARCH PROJECTS ON ECONOMIC AND SOCIAL IMPLICATIONS OF SCIENCE AND TECHNOLOGY

(For instructions on completing this form, see reverse side)

(PLEASE TYPE OR PRINT ALL ANSWERS)

NAME OF UNIVERSITY	SCHOOL OR COLLEGE
LOCATION	DEPARTMENT

TITLE OR PROPOSED TITLES	INTENDED FINAL FORM, E.G., BOOK, ARTICLE PAPER, DISSERTATION, ETC.	DATE STARTED	ANTICIPATED DATE OF COMPLETION	METHOD OF FINANCING THE PROJECT

FULL NAME AND ACADEMIC POSITION OF PRINCIPAL INVESTIGATOR AND OF PROFESSIONAL COLLABORATORS:

BRIEF DESCRIPTION OF CONTENT, INCLUDING METHOD OF INVESTIGATION:

SIGNATURE AND TITLE OF PERSON COMPLETING FORM	DATE

PLEASE ATTACH ADDITIONAL SHEETS IF NECESSARY (If no projects to report, please indicate on form and return)

INSTRUCTIONS

If the project you are reporting appeared in the last edition of Current Projects, do not use this form Principal investigators of last year's projects will be contacted individually.

Report *only* projects dealing with economic, social, or statistical implications of science and technology. In general, these projects would fall within the category of the social sciences, including business administration and, also, to a limited extent, engineering. Portions of the scope of this area of interest can not be readily delineated. Projects focusing on economic, managerial, and statistical implications of science and technology are generally easier to define than those dealing with the broader social impacts. Emphasis in this survey is on science and *technology*, and innovations resulting from progress in the sciences and technology, rather than on the effects of organizational, administrative, or social innovation.

Department: Please give the departmental affiliation of the principal investigator.

Intended Final Form: In general, projects conducted by graduate students should be reported only if they are on the doctoral degree level.

Method of Financing the Project: In the case of outside financing, indicate whether your project receives support from the Federal Government, State Government, university, private nonprofit institution or foundation, industry, personal funds, or a combination of the above. In most cases the outlay of personal funds contributes to the financing of research projects; please indicate "personal funds" only if these constitute at least one-third of the total financing. All information on financing is held confidential and is used for statistical purposes only.

Name and Academic Position of Investigators: Please list the name of the principal investigator first. For mailing purposes, titles of all investigators should be included. Faculty advisors to dissertations should not be listed.

Brief Description of Content, Including Method of Investigation: The description of the project should be written as the investigators wish it to appear in the publication.

Other: Please complete the entire questionnaire. This form may be duplicated or we will be happy to furnish additional forms upon request.

The listing of projects in this survey has no connection with the grants program of the National Science Foundation. We appreciate your cooperation in the conduct of this survey. For further information please write to Current Projects, National Science Foundation, Office of Economic and Manpower Studies, Washington, D.C.

* * * * * * *

Projects reported in past surveys of *Current Projects on Economic and Social Implications of Science and Technology* fall into the following classes of subject matter:

1. General Economic Analysis of Science and Technology
2. International and Foreign Studies of Science and Technology
3. Science and Technology in Developing Economies and Areas
4. Administration, Organization, Management, and Personnel
5. Decision-Making
6. Impact of Science and Technology on Selected Industries and Firms
7. Automation and Impact of Science and Technology on Labor
8. Patents, Trademarks, and Inventions
9. History of Science and Technology
10. Agriculture
11. Political Science, Government, Public Policy, and National Defense
12. Sociology and Psychology
13. Scientific and Engineering Manpower, Performance, Education, and Creativity
14. Innovation Including Studies on the Impact of New Findings, Processes, or Products

The above listing is illustrative and should not be considered a complete guide in reporting projects.

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